THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXVII. No. 1986.] LONDON, JUNE 4, 1901. [53RD YEAR. PRICE 6d.

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For use in the
RECOVERY OF SULPHUR,
ALSO
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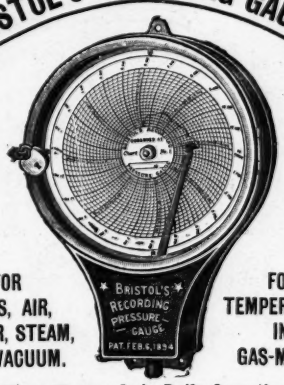

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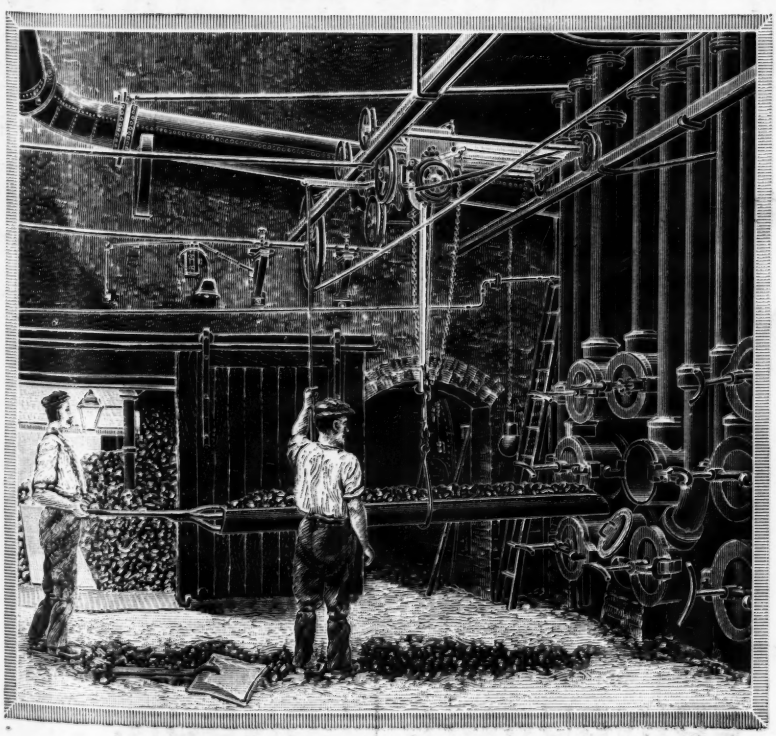

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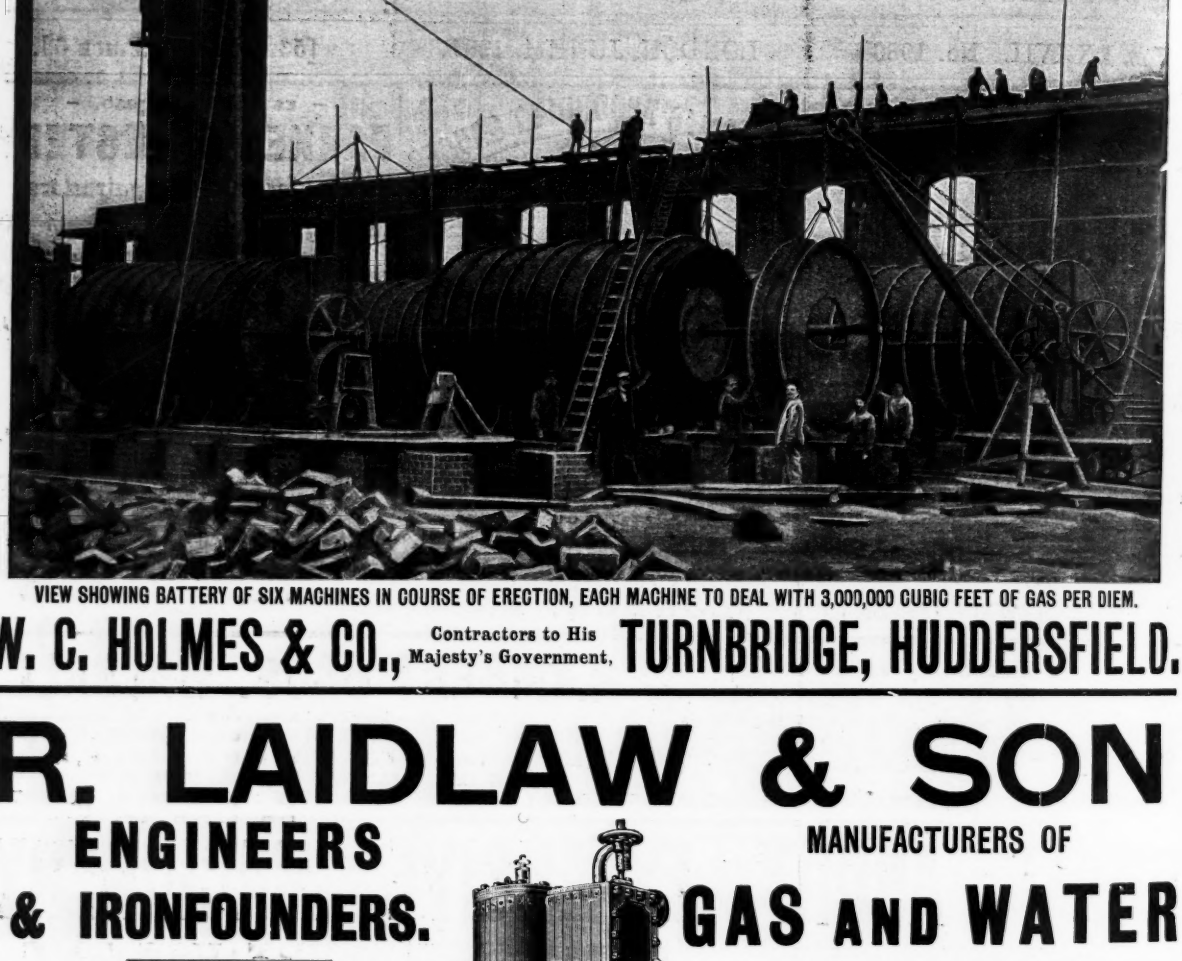

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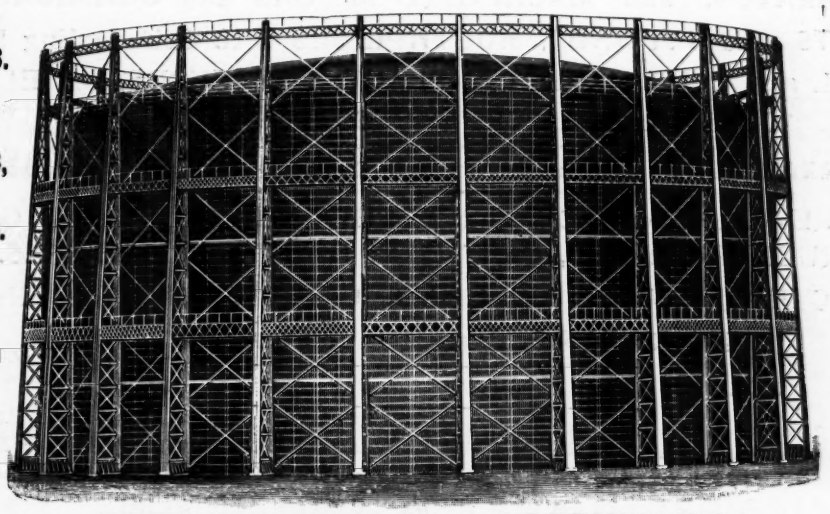

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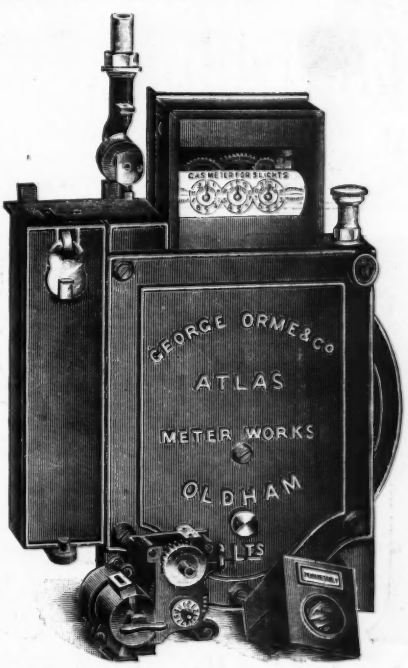

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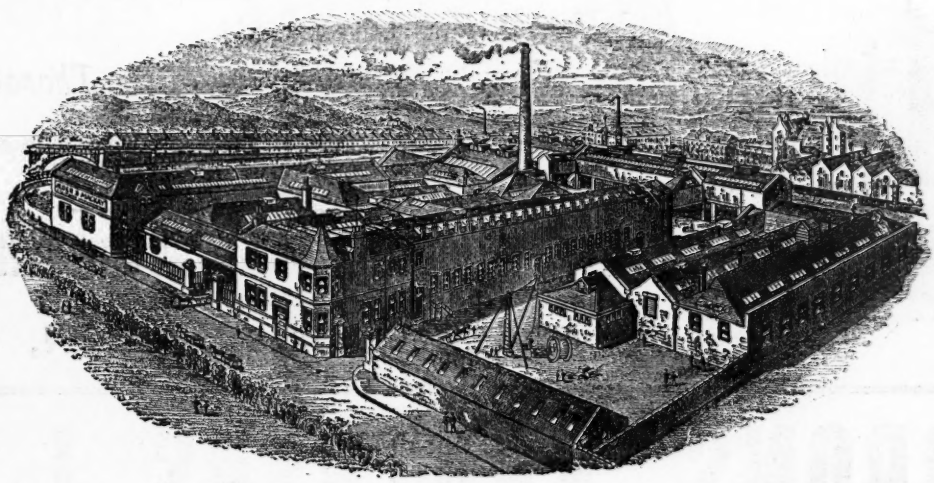

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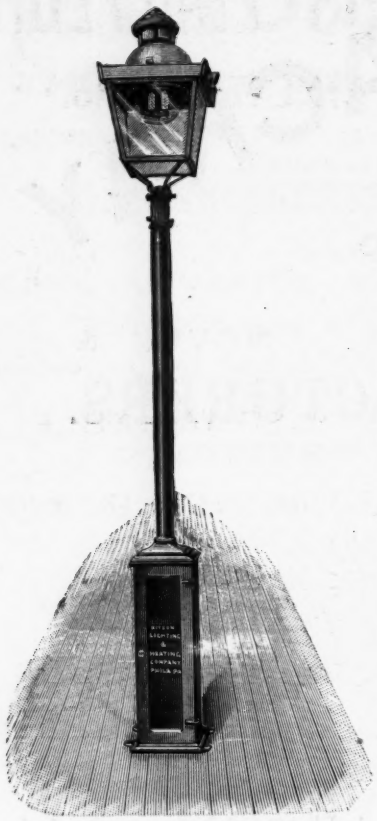

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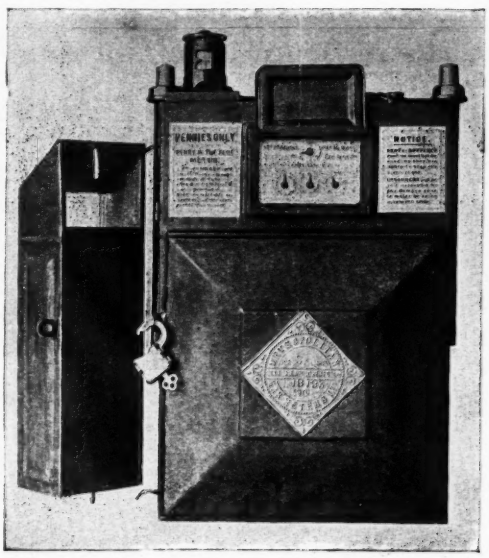

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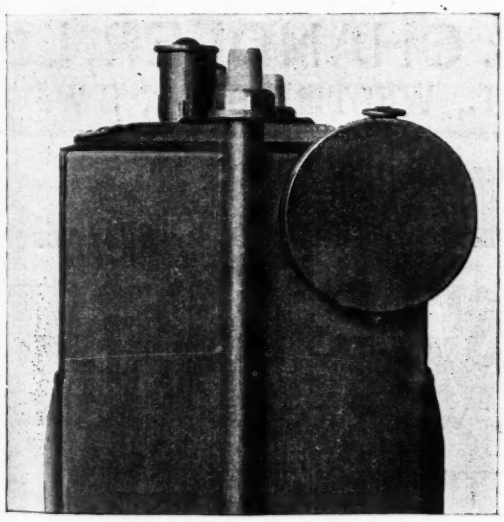

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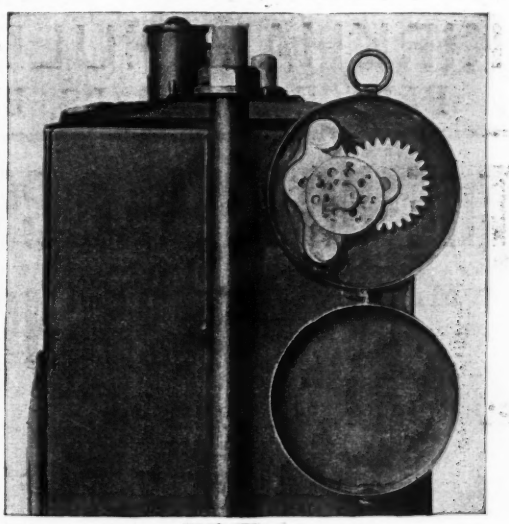

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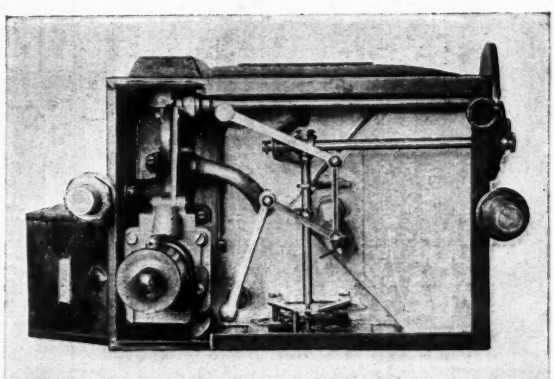

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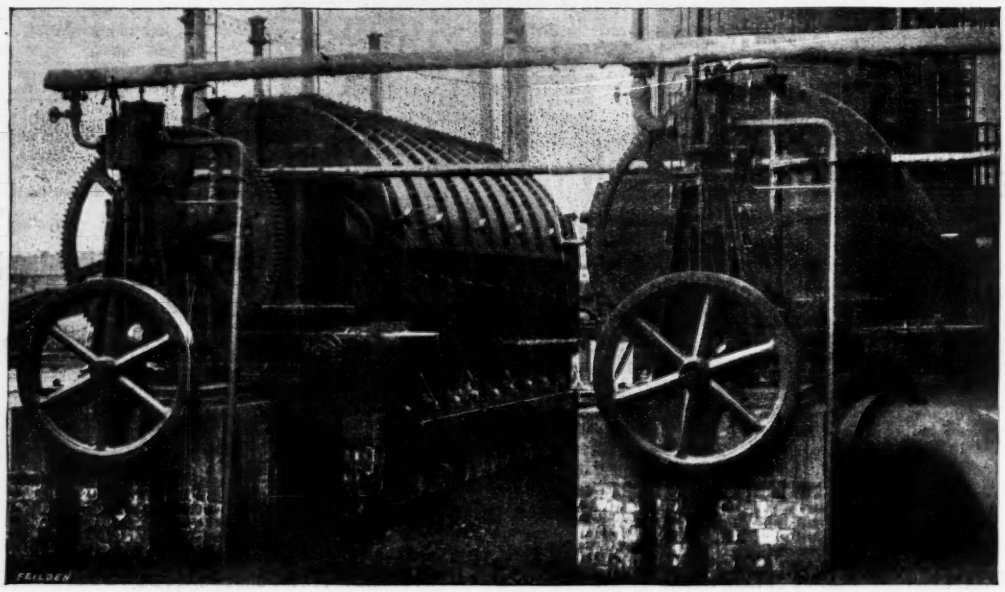

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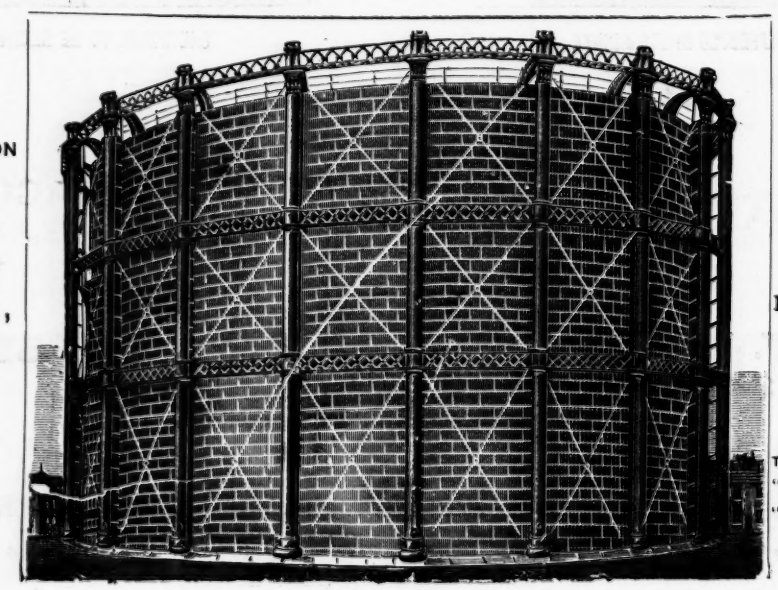

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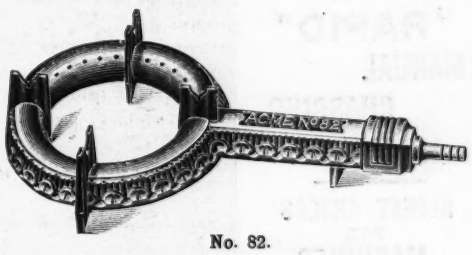

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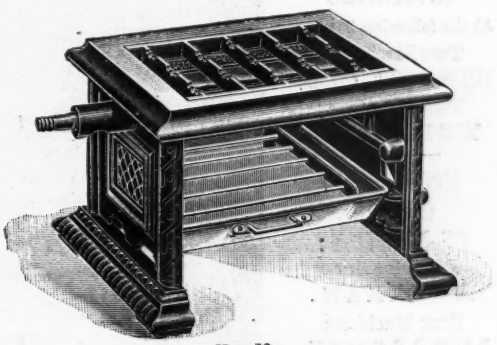

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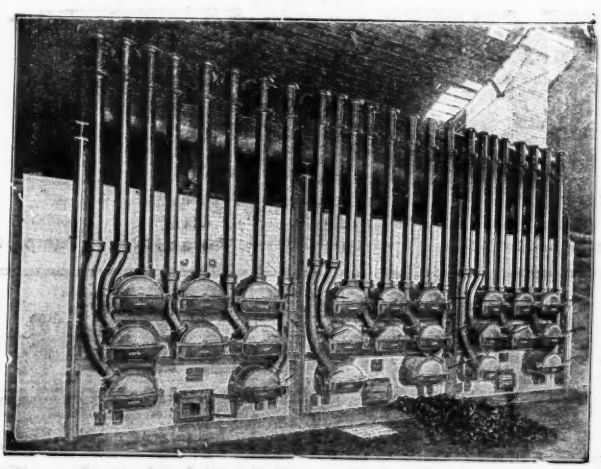

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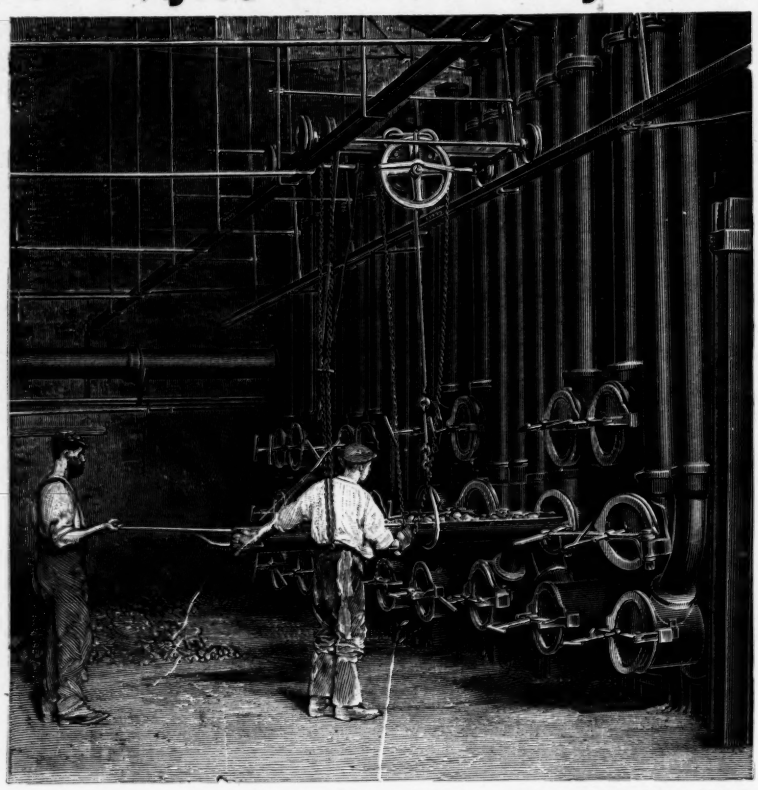

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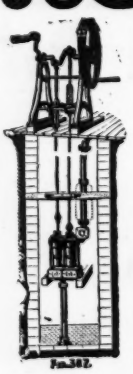

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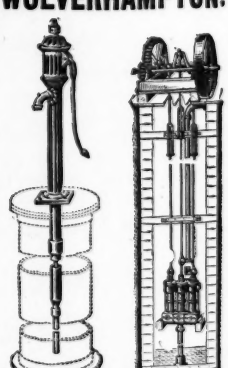

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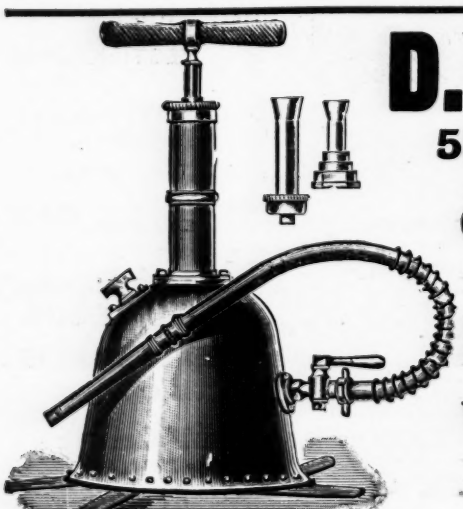

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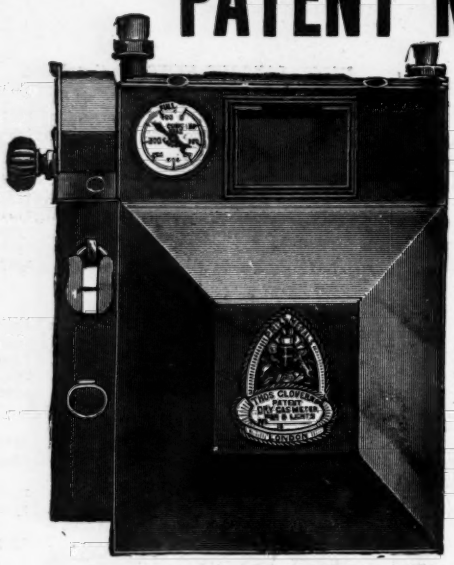

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES.

The Golden Rule for Municipal Trading.

It appears to be coming within the bounds of possibility that corporation electricity supply may, after all, prove a good friend to consumers of corporation gas. This will follow, if it comes at all, as an inevitable reaction from the latest scandal of Manchester, which was laid bare in these columns. Our articles on this fresh iniquity have received attentive consideration outside our usual circle of readers; and now "The Times" has joined in the appeal to Parliament to legislate for trading municipalities upon a logical and consistent principle. An important article on "Electricity and Municipal Trading," from a correspondent of "The Times," appeared on Saturday; and its conclusions were supported by a leading article in the same issue. There is nothing new to constant readers of the "Journal" in these contributions to the periodical literature of the subject; on the contrary, the matter will strike them as painfully familiar. But, after having clamoured alone in the desert so long, we must be pardoned for feeling a small degree of satisfaction in observing that others are beginning to make a chorus of it; the burden being that municipal trading for a profit is contrary to public policy, and should be forbidden by law.

The particular subject of municipal trading in electricity very happily serves as a test of the general question. Parliament has encouraged the creation of a multiplicity of local authorities, primarily for the better local self-government of the country. Other powers and influences have evolved a number of services, undertakings, necessary sanitary and communal organizations, which are not upon all-fours with the territorial limitations of local government areas. Yet, heedless of this discrepancy, Parliament by a mass of patch-work legislation, at the instance of the local authorities, has given them control over, and made them responsible for, many of these public services and supply undertakings. Again taking electricity supply as a test, it was recognized twenty years ago that the only known market for this novel commodity—artificial public and private lighting—was to be sought for within a very limited area lying inside the local government district. The local authority was encouraged, by the legislation of the period, to commit the whole of its resources—that is, the rate-fund contributed to by all the owners and occupiers—in order to provide an electricity supply in this small and select portion of its territory.

Now, owing to the progress of science and other causes, it has become apparent that if electricity supply is to render its utmost possible service to the community, it will have to be dealt with in a totally different manner. Instead of being confined to a small area of a town, it is expected to link town and country, and town with town. Its generation is to be in bulk, on specially favourable sites which may be far from where it is to be utilized; and its aid is confidently invoked for the decentralization of the labouring population. So it is with municipalized water supplies. The day is long past when the water for a large town could be pumped locally or derived without much difficulty from a neighbouring watershed. The great towns have to go far afield for their supplies, and associate themselves for the purpose with all sorts and orders of other interested communities. This is the real reason why the big Water Companies of the Provinces have so generally been superseded by Municipal Corporations or Joint Boards. It is not, as ignorant municipalizers do vainly talk, because public control of water supply is any better or cheaper than company working. It is simply because of the prevalence of the very natural and proper feeling that a private company trading for profit ought not to be endowed with those large territorial, overriding powers which a public body must possess in order to ensure the proper supply of a whole region with water. The element of profit-making is here exhibited as something foreign to the true purpose of the undertaking, and essentially objectionable.

The last-mentioned consideration supplies the golden rule by which Parliament should henceforward regulate all municipal undertakings. If municipal supplies of electricity, water, or gas are to be placed upon a proper footing, it can only be by insisting upon their being carried on for the benefit of the public, and not in order to subsidize the rates. If this rule is followed, there will be no such objection as now exists to the extension of municipal supply undertakings to their natural economic and industrial potentialities. The big city, for example, might extend its electricity mains to the farthest reasonable limit, and sell gas to the suburban communities to their heart's content. At present, this cannot be done, because these outlying communities rightly object to pay towards the relief of the rates of the central body. Nor is this all. Even where the surtaxed gas undertaking is coterminous with the district of the authority, the subsidy system is a curse. It checks the wiping-out of dead capital, which consequently remains an incubus on the business; it prevents the setting aside of sufficient reserves of cash; it forces the administration to borrow largely from bankers, thus paying interest on capital twice over; it keeps the price of gas continually going up and down, thus checking the confidence of possible large users for power and fuel; it keeps the price of gas high; it encourages, by screening, extravagant expenditure on the part of the spending departments of the corporation; and, finally, it neutralizes the intention of Parliament in entrusting public supplies and services to local government authorities, for the general good, not for the glorification of a Town Hall clique in the name of the "ratepayers."

And all this mischief flows from the apparently harmless phraseology of the model clause prescribing the method of application of the revenues of English municipal trading enterprises, which ends with the direction that the local authority "shall carry to the district fund any balance remaining," after the current needs of the undertaking are duly provided for. True, there is no prescription of the extent of the needs of the business to be satisfied out of the revenue account; so that there is no statutory bar to the observance by local authorities of the standard of good husbandry set by Glasgow and some other Scottish burghs. Town Hall humanity being what it is, however, there is no difficulty in understanding how it happens that the words of the model clause are commonly interpreted to mean that the undertaking may be bled to any extent that may please the authorities for the time being, to placate an incensed public. Parliament could cut down this common abuse, by enacting in every case that a yearly estimate of revenue and expenditure should be framed for every municipal undertaking; and that after all ordinary working costs had been provided for, not exceeding 6 per cent. on the capital outstanding should be charged to cover interest and sinking fund, any excess of "profit" over this to be applicable to the good of the undertaking or in reduction of the price of the service. There is precedent for this, but it is usually neglected; because Parliament habitually acts upon the assumption that what the local authority wants is best for the community represented by it. This is not so where money matters are concerned, as Manchester conspicuously shows. Where a corporation keeps shop in necessaries of town-life, and is at the same time responsible for making and spending rates, it is advisable for Parliament to "see fair" between all the interests affected; for there is no other power competent to perform this duty.

No Gas Coke for Malting.

The Commission of Experts appointed by the Manchester brewing interest to investigate and report upon the occurrence of arsenic as an impurity in beer have published their findings, which are numerous and particular. They went into the matter thoroughly, and nobody is likely to have much fault to find with their results. So far as readers of the "Journal" are specially concerned with the findings of the Commission, the subject can be dismissed with the statement that the use of gas coke for roasting malt is condemned. There does not appear to be a loophole of escape from this judgment. Those maltsters who used coke for the purpose are warned to abandon the practice, and consoled with the intimation that it will not give them much trouble to effect whatever reconstructions of their plant may be requisite with

a change of fuel. It is possible to accept this exclusion of coke from a certain kind of demand with philosophical resignation, while, of course, regretting the fact and its cause. It is not necessary to jump to the conclusion, from this formal statement, that gas coke is invariably highly arsenical, or that if it were it would be unsuitable for most of the purposes to which it is applied as fuel. In a few places, possibly, the defection of the maltster may leave a little more coke to be sold to other buyers, and may consequently temporarily glut the market. But this effect has already been discounted; and in any case the continued increase of the production of coke must sweep away in a brief period all small local eddies of the trade. The story is a romance of hygienic and chemical science; and as such it is worthy of being remembered when the scientific progress of the present year is being chronicled.

The Spur of Competition.

In "The Times" of Saturday last was published a letter from Lord George Hamilton, Secretary of State for India, to Sir Alfred Hickman, M.P., which should afford food for thought to both manufacturers and men in the engineering trades particularly, and to employers and Trade Unionists in general. On the motion for the adjournment of the House of Commons for the Whitsun holidays, Sir Alfred Hickman referred to the placing of orders for locomotives for the Railways of India in the United States instead of in this country, declaring that the American locomotives were inferior to British and had proved failures, and inferring that the placing of the orders was due to ignorance or partiality on the part of the railway authorities. Lord George Hamilton was not present at the time, and has rightly thought it well to answer the indictment (made against railways working under Government guarantee) at once. His reply is to the following effect.

Prior to the great engineering strike, no order for a locomotive for the Indian Railways had been given outside Great Britain. Owing, however, first to the stoppage of work, and then to the accumulation of unexecuted orders, due to the strike, the required number of locomotives could not be obtained from this country, and a few orders were of necessity sent to the States. The locomotives supplied were not at first completely satisfactory, but the makers promptly made the necessary alterations; so that now one at least of the companies wishes to obtain more engines of similar construction. That they will be forthcoming there can be little doubt; for one of the great points in favour of the States manufacturers is their ability to execute orders rapidly, as well as at low prices. These two factors in combination gave them the order for the Atbara bridge, and more recently that for the Gohteih viaduct.

Why should these orders have gone to America? Oh, say our manufacturers, what does it matter? we were full up with orders, and were obliged to work overtime to execute those we had undertaken. That sounds conclusive; but it is not. Before it can be considered so, the following questions must be answered in the affirmative: Were all the additional workshops constructed in this country that might have been—and would in the States at once have been—laid down to take up the surplus of orders? Were all the workshops in this country as fully equipped with labour-saving appliances as they might and should have been? Were all the workmen employed in the existing workshops turning out as great an output in their working hours as they might have turned out? The answer to these three questions must certainly be in the negative; and the blame for it lies largely at the door of that enemy to our trade prosperity, the Trade Unionist. What encouragement is there to the manufacturer to institute labour-saving machinery if the Union makes him pay skilled-labour wages to the men working it, and those men only allow the machinery to produce at a third of its capacity? We suppose the Trade Unionist out of work feels that he is entirely compensated for his loss of wages (due to orders going abroad) by the fact that his former employer has lost the profit he would have made had the man really done a good day's work for his money!

But the blame lies partly also with the employers. They seem to think, says Lord George, "that orders have only "gone abroad because those who gave them did not under-"stand their business. I wish that it were so. The com-"petition we have to face is founded on something much "more formidable and substantial. Chemical research, "concentration of capital, thorough technical education, "improved industrial organization have made in recent "years greater strides in America than here. It is with the "product of these combinations, and not with the assumed "stupidity of Indian officials, that the British engineer has "to contend." Are these not lessons for those engaged in the gas industry? Are they not often satisfied with a good business, when by greater enterprise and skill they might have a better? Are they as well armed to meet competition as they might be? Do they never abuse the man as a fool who prefers other sources of light, heat, or power to gas, when it is they who are at fault in not providing their own speciality at a low enough price, or in not being active enough in bringing its advantages before actual as well as the possible consumers? Do they never submit tamely to the tyranny of Trade Unionism when firmness and persuasion might achieve much in the direction of co-operation between men and master? These are days of ever-growing competition for the gas industry, as well as for other industries in the country. Let all concerned make sure they are doing all that in them lies to secure success for their side in the struggle. When is London to see a display of gas lighting in the streets to eclipse the Kitson light, on a scale as large, and in a thoroughfare as prominent, as the installation in Portland Place?

A New View of Electrolysis.

The actual condition of the question of electrolysis in the subsoil of streets covered with electric tramways cannot be regarded as satisfactory. The legal position has not been cleared up; and no gas or water works engineer could say off-hand what is the exact legal status of his mains. They are laid underground and removed by statutory sanction, where there is a Private Act of Parliament for the undertaking; but that enactment merely arranges the relations between the owners of the pipes and the local authority. Inasmuch as the legal rights of the local authority only touch the surface of the highway, and do not extend to anything beyond the road surface itself, when mains and pipes are once buried and at rest in the road, they seem to be as much a part of it as the corresponding displacement of earth and stones. If this is so, is there any right attaching to them that may be wronged? The answer must be in the affirmative, where pipes are injured in their place by the operations of other would-be occupiers of the subsoil, or of those who improperly use the surface of the highway, as by the employment of unduly heavy steam-rollers. This consideration does not fully cover the legal aspect of electrolytic injury; but it appears to be of the same nature. It is the unique beauty of the common law, however, that nobody ever knows what it is until the Court has decided a case in point; and then the Court may be mistaken.

The current number of the "Electrician" has a well-written article on the science of the subject, in which the earth is considered in its capacity as a conductor of electricity. When telegraph and telephone engineers first went to work after their manner, they found it possible to dispense with a return wire to complete their presumed circuits, by having recourse to the simple expedient of "earthing" the conductor after it had done its work. The hard fact was indisputable; and the theory was made to fit it. It was generally stated that the earth played the part of an infinite return conductor, and capable of operating in the desired manner in any direction; and there was an end of speculation. This convenient assumption lasted till the electric lighting and tramcar driving order of electricians went into business on the large scale, when it was found that the old hypothesis would not bear the increased strain. Whatever happened to the tiny telegraphic currents, the strong electric lighting and power currents could not be got rid of in the same simple way. Hence, if the earth was a conductor, its capacity must be regarded as exceedingly small. A fresh theory therefore arose, to the effect that the earth was not a conductor at all, but an electrolyte—which was as much as to say that the old idea of the earth "return" was a figment, and that electricity turned into the earth only disappears in electrolytic action upon what it finds there.

The latter view, of course, was a terrible fright to those who believed in it and were able to work out the electrolytic equivalents of lost currents. So much electricity gone away from the conductors provided for it, so much of the nearest available iron destroyed. The whole proof was so simple; and our electrical contemporary gently chaffs the gas and water companies who haled certain professors before Parliament recently, and paid them for exhibiting little lecture

table experiments showing how electrolytic damage might be done. As a matter of fact, however, the late Sir Courtenay Boyle, while greatly sympathizing with the nervousness of the owners of gas and water mains, counselled them to wait until they had actually been hurt, and promised that in the meantime the Board of Trade should look after their interest. Now it is reported that a French investigator (M. Claude) has considerably straightened out the question of electrolytic damage by proving, first, that the earth acts largely as a conductor; and, secondly, that only a small percentage of wandering current enters into neighbouring pipes.

Obviously, if these observations, which were made upon experiments at Havre, can be really relied upon, the risk of electrolytic injury to gas and water pipes from stray currents is much less than has generally been supposed. It is incumbent upon British tramway electricians to repeat M. Claude's determinations without delay. Briefly stated, he finds that where a formidable-looking difference of potential was artificially created between pipes and rails—so that a considerable charge of escaped electricity might be looked for in the pipes—as a matter of fact the charge was always "ten, twenty, fifty times" smaller than was to be expected. The greater part of the unaccounted for current circulated in the earth itself. This is generally a considerable amount—much greater than is commonly suspected. It never falls below 12 or 15 per cent. of the power current, according to M. Claude; but very little of it goes into the pipes. One must therefore consider that all the evidence of pipes being electrolyzed in America is due to the existence of special local conditions favouring the action. All the same, gas and water engineers will in the circumstances be well advised in keeping a sharp look-out; for one electrical theory is only good until a better is formulated.

Circulars—Imposing and Deceptive.

If the officials of gas undertakings had sufficient time or the inclination to read all the circulars sent to them, they would find that a large number—we abstain from saying all—could be filed under four labels inscribed with the words "inquisitorial," "imposing," "crafty," and "deceptive." We frequently receive from bored managers examples of all four species, with a suggestion that a little protest on their behalf might assist in relieving them of this perpetual annoyance. We have on several occasions protested; but circularizers appear to be as insensible to pointed disapproval as an elephant is to the lash. If, however, reiteration of the protest will help towards suppressing the nuisance, we can promise to do our part in working for a mitigation of the evil. The worst form of circulars are unquestionably those which come under the inquisitorial class; for, as a rule, they are the most pernicious in their effects on the dignity and status of the gas profession—emanating as they usually do from persons who desire to obtain information "on the cheap," or who wish to use it in the oppression of some unfortunate member of the gas fraternity. This particular class of circular we have already condemned; and we fancy that of late years less has been seen or heard of such objectionable interrogatories.

It is, however, against the other three types of circulars that we have to protest on this occasion; and in their way they are almost as unpleasant as the class to which we have just referred. First come those which, if the questioners were satisfied, would impose an unwarrantable burden on the good nature and time of those addressed. There is all the difference in the world between obtaining information from a personal friend and sending broadcast a circular-letter containing a number of inquiries each of which would need investigation, and call for some amount of explanation in order that the answers might be of value. And, again, there is a distinction between circularizing for information which is intended for the common good, and appealing for information which is only required to serve an individual's private ends. One correspondent has lately forwarded to us a list of four questions, which he tells us has been sent to him by a fellow manager, for what purpose we wot not. They are: "(1) The total cost of lighting the streets of your "town by electric arc lamps. (2) By ordinary gas-light. "(3) By ordinary incandescent light, including Kern burners. "(4) By intensified gas lighting." Well may our correspondent ask, "Is not this a tall order?" To ensure that there might be no misconception, each one of these questions would entail the giving of particular information, the compilation of which would need more time than a busy manager has at his disposal. Beyond this, we learn from our correspondent's communication that no mention was made of the purpose for which the information was required; and it is not every gas manager who finds it convenient or desirable to have such answers as are here sought for brought into public comparison without full and explicit interpretation. Managers who ask for information should at least be considerate.

The circulars which we place in the last two categories are from commercial sources; and for emanations such as the examples we have before us nothing short of harsh expression is likely to have any effect. About the framing of two which we have principally in view there is a distinct trace of craftiness; and one of them contains a misrepresentation of fact, the only purpose of which can be to deceive. The first is abruptly addressed to the "Chairman "of the Gas Committee;" and it asks whether he has considered the "enormous advantage" to be derived by having a certain brand of goods which are in daily use in a gas undertaking. The circular submits that the engineer should have a sample for testing; and, without waiting for permission, the sample is sent to the Chairman! Such a way of trying to obtain an entry to a gas undertaking for business purposes is sure to bring its own defeat. It is an insult to the position of the gas engineer. No self-respecting man will brook tactics of this kind; and those who adopt such artifices are unlikely to obtain any consideration from him. Then there are the misleading circulars. The one we have before us quotes a number of towns the gas-works of which are, it is distinctly asserted, "being supplied" with a certain article of daily use. The correspondent who complains about this circular does not do so without good cause. His own works appear among those which are "being supplied;" while the fact is that only a small sample parcel has ever been received on the works, and permission for that to be sent was merely given on the urgent solicitation of a representative of the suppliers. Now we recognize to the full the severity of the industrial struggle of to-day; but such methods of trying to obtain business show in our commercial life a degeneracy from true business principles. We hope it will not continue; for in the gas industry we have always fought for the maintenance of a worthy standard in all the relations of the manufacturer and the user.

A Scandalous Piece of Trade Unionism.

A REALLY excellent example of the ways of militant Trade Unionism is supplied by the manœuvres of the Amalgamated Society of Railway Servants, which appears to exist chiefly for the support of Mr. Bell, M.P., who is certainly extremely clever in preserving his risky eminence for the smallest possible showing of services rendered. On the other hand, he makes a considerable fuss about what the Society might or could do, if they would; so the friendly newspaper reporters are just as well pleased as if the great strike of railway men, so often promised, were really to come off some fine morning, and the newspaper trains were to remain in the sheds. Mr. Bell has a feud with the Directors of the London and North-Western Railway Company over the sequels to the famous Linaker lawsuit. The Board saw reason for deciding that the way in which false witness was manufactured against Mr. Linaker, in the interest of the Union, proved the existence of so much disaffection and demoralization among their servants who had become entangled in this scandalous affair, that a vigorous clearing out of the infected members was necessary. Accordingly a number of men were dismissed the service, and others were shifted to fresh scenes. With most tremendous creaking, the machinery of the Union was thereupon set to work to obtain redress for these intolerable wrongs; and the great Mr. Bell duly went and posed as the men's only friend. For some inscrutable reason, there is a reporter on the "Pall Mall "Gazette" who listens to Mr. Bell, and provides him on occasion with a larger audience than he is always accustomed to address. First the politic Mr. Bell was all against the idea of having a strike. Then he would not interfere if the local men wanted to strike. Next the Executive of the Union had decided to leave it entirely to Mr. Bell to take such action as might be necessary in the interests of the men. Lastly, there is to be no strike, but the sufferers are to be compensated out of the funds of the Society.

That will be all right, and the only proper way out of the hole into which their Unionism has placed these men—if the compensation is on a reasonable scale. The Amalgamated Society of Railway Servants will never countenance a strike, which would be its death warrant. But—and here

is fair matter for protest against the "Pall Mall Gazette"—hear what it permits Mr. Bell to say against the merciful conduct of the Board in remitting some of the disciplinary sentences out of consideration for domestic vicissitudes. He "regarded this compassionate action as a sign of weak-"ness on the part of the Directors. If these men have "really been guilty of combining to give false evidence, they "are entitled, he said, to no sympathy whatever." That is the thanks a Boer usually returns for mercy bestowed upon him for the sake of his innocent wife and children; but it may be doubted whether the London and North-Western Railway men will approve of the display of the same spirit in connection with their own employment.

WATER AFFAIRS.

The Relation of Water Supply to Disease.

AMID much that is uninteresting to "JOURNAL" readers in the bulky volume of 650 pages which has lately been issued as a supplement to the Twenty-Ninth Annual Report of the Local Government Board—comprising the report of the Medical Officer (Mr. W. H. Power, F.R.S.) on the work of his department in the year 1899-1900—there are certain matters bearing on the relation of water supply to disease to which attention may be briefly directed. As the result of the discovery by a distinguished scientific investigator some years ago, that typhoid fever was propagated by the consumption of polluted drinking water, every outbreak of this disease in a village or town naturally caused the water supply to be suspected—and, it must be acknowledged, with justice. With the case of Maidstone in our recollection, it would be ridiculous to deny the connection between contaminated water and a typhoid epidemic. At the same time, it must not be ignored that other agencies are at work to bring about results which the unreflecting are too apt to attribute to altogether erroneous causes. How the typhoid bacillus finds its way into the human body it is difficult to say; but it appears to be a well-established fact that the exclusion of this organism is not to be effected simply and solely by the exercise of vigilance over the water supply. Impure air, sewage-laden soil, and an inefficient system of drainage, are all factors to be reckoned with when inquiring into the cause of an epidemic. Examples of this are furnished in the report above alluded to; but for the present we will deal with only one.

Chichester has for some years been liable to the recurrence of enteric fever to a serious extent. The city stands on ground which is for the most part flat (where there is any slope it is from north to south); and the soil is coarse gravel overlying the clay of the London and Reading beds. The water supply is derived from wells—some private, others in the hands of the Corporation, who own the water-works. A sewerage system was carried out between 1893 and 1895; the sewage being treated at outfall works situated on the banks of the Fishbourne Channel, about a mile-and-a-half south-west of Chichester Cross. In November, 1898, there were upwards of 500 houses which did not discharge into the sewers, though in each instance a drain had been carried towards the houses as far as the footway, and an intercepting trap provided. These were the circumstances in which Chichester found itself when, three years ago, owing to the prevalence of enteric fever, certain of the inhabitants petitioned the Local Government Board for an inquiry by an Engineer and a Medical Officer of the Department. Dr. Thomson and Colonel Marsh, R.E., were sent down.

According to the report of the Inspectors, the mortality from enteric fever in the city during the quinquennium 1871-5 was lower than in England and Wales. During the succeeding five years, however, the death-rate from this cause rose far above that of the country as a whole, and did not fall again below that level until 1891-5. This improvement was followed by the serious epidemic of 1896-8, when the death-rate was 0·64 per 1000 persons living, compared with 0·17 per 1000 for England and Wales. The number of cases of enteric fever, exclusive of those that were imported into public institutions in the city from other sources, notified in 1895 was 2; but in 1896 it was 116; while in 1897 it was 13 more, or 129; and in 1898 it fell to 100. With regard to the causation of the fever, the Inspectors could not find any ground for believing that the water supply played any notable part in it. In 1896 little more than half the houses in Chichester were being furnished with water from the public supply, and 2·6 per cent. of them were invaded by fever. But, on the other hand, 2·9 per cent. of the houses obtaining their water from local wells were similarly infected. Taking the two following years, the figures were 4·1 and 3·6, and 2·6 and 3·7 per cent. respectively. The conclusion drawn by the Inspectors from these figures is that the hypothesis that in each of these years both the public water supply and a considerable number of local wells situated widely apart became simultaneously vehicles for the transmission of the infective material of enteric fever, is "too remote from probability to "require serious consideration."

Summing up their inquiries, the Inspectors say that the evidence submitted to them was not consistent with water having been a main factor in the more recent dissemination of enteric fever; while as to its recurrence in former years, the data available did not afford ground for coming to any definite conclusion on the subject. Nor do they think the sewerage system, either in its present or in its previous condition, can be held responsible for the trouble. Other causes investigated were milk and shellfish. But the Inspectors were unable to associate them, to any notable extent, with the various outbreaks of disease in the city. Having failed to trace these epidemics to the agencies generally known, the Inspectors were driven, by a process of exclusion, to attribute them either to the peculiar character of the soil on which the city stands, or "to some as yet "unrecognized causative condition." It has been shown by Drs. Martin and Robertson that soils that are rich in organic matter are more favourable to the vitality and growth of the typhoid bacillus than are those in which there is little or none of such matter. In this respect, Chichester may be regarded as presenting just the conditions requisite for the production of this organism. Prior to the introduction of the sewerage system, the houses were provided with closets discharging into cesspools which seemed to have allowed a very large part of their contents to escape into the surrounding soil. Though soil-pollution of this character cannot be regarded otherwise than as a potent factor in the causation of enteric fever, the Inspectors think it is difficult to believe that there are not other towns in the kingdom where it exists to as large an extent as in Chichester, without producing effects anything like so harmful as those they found. They are therefore forced to the conclusion that, though the hypothesis that the epidemics they had to investigate were referable to the existence of conditions of soil especially favourable to the vitality and growth of the infective material of the particular disease which gave rise to them, it did not afford adequate explanation of features which had characterized the time and place distribution of the fever. They think that fuller knowledge of soil-conditions in their relation to the prevalence of fever may account for these features; but without this knowledge, it is not possible to arrive at a definite conclusion. Its acquisition would entail prolonged investigation of the similarities and dissimilarities in local conditions obtaining in places which are specially liable to outbreaks of typhoid fever and in those which are practically free from them. The Inspectors, however, consider such an investigation is urgently called for, in the interests not only of the city specially concerned, but of not a few other localities in the kingdom. The "conclusion of the whole matter," therefore, appears to be that, while attention is concentrated upon a water supply as a possible contributory agent in causing an epidemic, there may be at work a much more serious one, in the shape of soil pollution, of which the existence is unsuspected.

The Validity of the Belgian Welsbach Patents.—Last January a statement appeared in the "JOURNAL" to the effect that a Syndicate, composed of all the principal parties interested in the gas industry in Belgium, had been formed with the object of having the Auer patents for that country declared null and void. Application was duly made to the Brussels Court to declare the nullity of these patents, especially that of 1892—corresponding to the Company's 1893 English patent. In a letter received yesterday from the correspondent who forwarded this information, he said: "I am glad to be able to report about our action against the Auer Company. Judgment has been given, and is quite in our favour. The Judges found that the Company's claim on the validity of their patent of 1892, as a patent distinct from the older patents, was wrong; and they declare that this last patent has become void together with them. The monopoly of the Auer Company is thus at an end, at least for the present. The right to appeal is still open to the Company; but it is very unlikely an appeal can be profitable to the appellants."

ESSAYS AND REVIEWS.

THE WHIT-WEEK LABOUR CONFERENCES AND PROFIT-SHARING AT CHESTER.

THE past week was not only a holiday time, it was the season of conference for several interesting organizations of working-class people; and students of their fellow man in his corporate capacity consequently had no lack of matter for their consideration. The coal miners held an International gathering, which only failed of being impressive by reason of the absence of the Durham men. The Co-operators had a not too harmonious meeting, at which they displayed a greater liking for party politics than for co-operation. The Irish Trade Union Congress showed their independence of the "foreigner." The Manchester Unity of Oddfellows held a thoroughly businesslike meeting in Norwich, and the Independent Order of Oddfellows met in the same spirit in Birmingham. The latter gathering had the privilege of hearing from Mr. Joseph Chamberlain his ripened views on the subject of Old Age Pensions. Altogether, it has been a great time for the ventilation of working class politics and sentiment. On the whole, the different gatherings abundantly justified the English liberty of meeting to talk over grievances in public, which is at the foundation of the national freedom.

Yet when reading the impartial newspaper reports of some of these free meetings, a disinterested observer must often experience a feeling of disappointment at the unpractical, visionary, futile nature of much of the counsel of these ostensibly practical men. Surely, it might be assumed, if hard-handed, hard-headed labouring men are not only permitted, but greatly encouraged, to meet together according to their respective orders and interests in the community, the result will be such a setting-forth of grievances, and such a clear indication of what these men know by experience to be what they want, as cannot fail to be interesting to the average citizen, and instructive to the members of the governing class? But, unfortunately, this apparently reasonable *à priori* assumption is falsified almost every time. Only last year, an intelligent woman member of the Trade Union Congress reproved this organization for talking rubbish, and wasting time in passing resolutions which nobody believed to be of the slightest use. And again last week, the International Miners amused themselves by passing resolutions in favour of a universal eight hours day, and a minimum wage of 10s. per day, for all workers of coal, which they must have known were about as empty and valueless as any form of words that could be put together.

Similarly, the assembly of co-operators distinguished themselves by turning upon their last surviving founder, who may be supposed to know the true character of the movement, and dissipating their energies in calls for State-paid old-age pensions, the nationalization of railways, and other Socialistic tokens. This tendency of associated working people to play at communistic politics would be a sadder spectacle than it is, if it were not also susceptible of a very comforting interpretation. There cannot be, one may reasonably deduce from the fact, much the matter with the lot of the British workman if he is content to devote the rare occasions when he realizes his organizations to verbal fire-work displays—most of them "set pieces," with a framework that is brought out year after year for the same exhibition. Of course, these periodical meetings are worth somebody's while to keep up, or they would be dropped. Certain newspapers affect to take the proceedings seriously, especially when they happen to chime in with their own party cries. But in less than a week they are forgotten. Meanwhile, the things that really matter to the industrial community go on elsewhere.

On p. 1519, will be found the announcement that the Directors of the Chester Gas Company have formulated a scheme of profit-sharing upon simple and elementary lines. We venture to hold that a single fact of this character is worth all the congress votes ever passed for the "principle" of requiring every night to be well and sufficiently lighted by the moon, or some such unattainable ideal. For a step once taken by a gas company in the way of ameliorating the lot of the workers on the establishment can never be retraced. Gas workers never have to fear hard times, works shut down, and the other unpleasant incidents of day labour in other employments. The gas company is the model employer—not the municipal corporation, which frequently poses for such. There is nobody belonging to the company who wants the labourer's vote, or has the smallest temptation to bow down before the Trade Union official. And, consequently, what the gas company does for the workman is neither politics nor charity, but strict business. This cardinal fact the workman thoroughly understands; and it ought to have some effect in strengthening his feeling of independence, unless this has been cozened out of him by his politicians.

The new labour scheme of the Chester Gas Company appears to be of an elementary character. It comprises two separate and distinct divisions; the first relating to old-age pensions, and the second to profit-sharing. In regard to the former, there is little to be said, except to acknowledge it as an acceptable addition to the number of similar arrangements which are lightening the difficulty of a general provision of old-age pensions by taking out the cases of detail industries. Every industry ought to provide for its own aged hands, as is now done under the Workmen's Compensation Act for its injured. The same principle underlies both kinds of provision; and this, we take it, is the key to Mr. Chamberlain's mind on the subject, which has been so laboriously discussed by his political opponents. According to the Chester Company's plan, upon attaining the age of 65, a man with 25 years' service to his credit is to be entitled to a pension at the the rate of one-third of his full ordinary weekly wages. At any age after 50, a workman permanently incapacitated from further work will be granted a similar pension. Aged workmen with less than the full stipulated service behind them will be entitled to a proportionate allowance; but such cases must be rare, as men of 40 are not often taken into the service. No information is given in regard to season hands.

The profit-sharing scheme is applicable to all employees of the Company, high or low. An initial price of gas of 3s. 4d. per 1000 cubic feet is assumed as the datum; and the employees' share of the profit made will be 1 per cent. upon the year's earnings for every 1d. per 1000 cubic feet which the selling price of gas for the year shall fall below this initial price. Thus it will be perceived, as is indeed inevitable in the case of a gas undertaking, that the scheme starts from an arbitrarily assumed datum. At the same time, it works in the same sense as the sliding-scale, and helps to emphasize the truth that, by this arrangement, the cheaper the gas the more profitable the business of selling it; and it is an extremely simple and easily comprehended rule. The immediate effect of putting such a plan into operation, upon local public opinion and upon the employees who participate in it, cannot be other than good. The public will perceive hereby, as they probably never did before, the reality of the interest of the Company and all concerned in it in selling gas as cheaply as possible. The participants will have an inducement to faithful service and the avoidance of unnecessary waste which may easily recoup the undertaking the cost of the scheme, old-age pensions and all.

A volume might be written upon this aspect of the subject; but one illustration will suffice to show how money that is squandered in paying superfluous wages, under the system which flourishes where Trade Union principles rule supreme, is saved where the workmen recognize that it is worth their while to economize. Apart altogether from the question whether Trade Unionism is organized laziness or not, no apologist for the Unions will deny that their rule is "one man, one job." A bricklayer must not set a stone; a stonemason must not touch a brick; and so forth. When this rule comes to be applied to the subdivisions of trained, as distinguished from skilled labour—such as that of carbonizing in gas-works—the results would be laughable if they were not so vexatious and costly. The stoker must not put an auger into an ascension pipe, nor use an oil-can for a retort-lid screw. Special hands must attend to these incidentals. It is to be supposed, that if a stoker happens to drop a shovel into the coke-hole from the stage, a special man ought, strictly, to retrieve it. No explanation is needed to show the least technical of persons that the money is likely to run away alarmingly under such a system. The ancient spirit of community of interest between master and man has quite evaporated under the desiccating influence of Socialistic Trade Unionism. The oratory of the street-corner preacher of the doctrine of the essential antagonism of the interests of capital and labour has borne fruit in the refusal of the workman to do a hand's turn outside his own particular job, and in his determination to do as little as possible in it.

There is a margin, moreover, between the rigid dutifulness of the as yet unspoilt workman who is worthy of his hire, and the willing husbandry of the employee who has always his master's interest at heart. Unhappily, the growth of the joint-stock system, and the development of huge industrial establishments in which individuals cease to be able to feel their own importance, have gone far to discourage the latter spirit. Human nature being what it is, it is much to expect either workmen or officers to take a lively interest in the affairs of a big company, or of a millionaire employer, who does not reciprocate the feeling. Profit-sharing is the only expedient known to science for supplying this missing link. Let it be as arbitrary a disposition as may be, anything that reunites the pecuniary interest of the employee in the financial results of the business in which he is engaged can scarcely fail to be good for both parties.

This conclusion, in its turn, is open to correction by the teachings of experience. The chief weakness of profit-sharing schemes lies in the transient character of the impulse towards greater faithfulness and higher efficiency. After a year or two, the employee gets to regard his share of the profit (so-called) as a mere premium upon his wages; and consequently the benefit passes through his pocket without altering his status. We gather, from the report of the Chester Gas Company's scheme, that participants in it are to be entitled to draw out their bonus yearly. Oddly enough, one newspaper which publishes these particulars heads its article "Thrift Encouragement." A little more familiarity with the subject would have taught the writer that this title is a misnomer. There is no encouragement to thrift in giving a man a tip once a year, without at the same time helping him to put it by for his permanent benefit. It may have appeared too formidable a venture for the Directors of the Chester Gas Company to adopt at a blow all the South Metropolitan equipment of stock investment, not to mention Workmen-Directors, as the complement of profit-sharing; but if the question is posed of how profit-sharing is to be made to redound to the greatest lasting advantage of the participant, what must be the answer?

If there is a shorter and easier way to the goal aimed at—which, be it remembered, is the greatest good of the employee, not of the master only—it would be gratifying to know it.

We are the more free to state this consideration at large, because we have never been able to accept as conclusive what seems to be Mr. Livesey's judgment, that the thriftiest workman is necessarily the best workman. Consequently, we have always kept an open mind respecting the merits of the special developments of the South Metropolitan system of rewarding labour. These undoubtedly suit the time, the place, and the occasion; but it by no means follows that they would prove of universal validity. It will be interesting to follow the course of the Chester experiment. Although nothing is said on the point, it is obviously desirable that those participants who might prefer to leave their share in the undertaking, at the ordinary rate of dividend for the time being, should be enabled to do so.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 1525.)

THE Stock Exchange re-opened with a very quiet tendency on Tuesday after the Whitsuntide recess, many faces being conspicuously absent, and the general interest seemed to centre in the approaching settlement after the Northern Pacific storm. As this continued to progress with every prospect of being successfully smoothed out, so the ruling tone improved, and a better feeling in general prevailed. Still business remained very quiet, and in some quarters there was a degree of dulness. Consols were done at 93⅜ on Friday; but they picked up a bit at the close. English rails were a poor market; but American, of course, were on the rise. The Money Market was well prepared for a considerable demand in connection with the settlement; so that all requirements were easily met (especially as, after all, they fell short of the anticipated volume), and at the close the tendency was in favour of pronounced ease. The Gas Market has seldom, if ever, been in such a state of inanition as it was last week. Not a single variation in any quotation, except those arriving in connection with the adjustments to *ex div.* values on Friday, was recorded all through the week until Saturday, when one change took place, just to break the absolute immobility. This, by-the-bye, applies only to the London market, for in the Provincial markets a couple of local stocks did move. It goes without saying that business was very quiet. Only on the opening day was there anything of an approach to moderate business, when Gaslight ordinary was uncertainly disposed, opening at 95¼ then falling a point, and subsequently rising and falling again. However, the closing mark on Saturday, 95¾, was the best of the week. The secured issues were weaker; and the preference quotation was reduced a point on Saturday. As for all the rest, they may be dismissed with a very few words. There was one deal in South Metropolitan and one in Commercial, both at moderate figures. The Suburban and Provincial group were hardly touched; but locally Newcastle had a fair advance, while Sheffield "C" was a couple of points lower. The Continental Companies and the undertakings in the remoter world were quite devoid of incident. The Water Companies exhibited their usual condition of quietude, though for once they were surpassed by the Gas Companies in the negative quality of nothingness.

The few transactions recorded were not remarkable, and all quotations closed unchanged.

Coke in the United States.—A recently-issued census report shows that the value of coke produced in the United States in 1899 was £7,107,089, including bye-products valued at £190,405. This represents the direct product of coke, and does not include the coke obtained as a bye-product in the manufacture of illuminating gas. Special features in this industry since the census report of 1890 are the introduction of retorts or bye-products ovens; the increasing use of coke for domestic purposes; the large increase in the practice of washing the coal before charging the ovens; and the decreased cost of coal, due to improved mining machinery and methods. The improved ovens and the practice of washing the coal increase the percentage output. Three classes of bye-product ovens are now in use—the Semet-Solvay, the Otto-Hoffman, and the Newton-Chambers. There are 1020 of these ovens; and they produced 906,534 tons in 1899. The total product of coke in 1899 was 19,640,800 tons. The number of establishments—exclusive of one at a penal institution—is 241, representing a capital of £7,300,000. These employ an average of 17,000 persons, and paid £1,417,000 in wages during 1899. The cost of the material was £4,000,000. There were 47,142 ovens in operation, and 670 idle. The former used 30,157,829 tons of coal in the production of 19,640,798 tons of coke. Of the coal, nearly 26,000,000 tons were unwashed; while 21,000,000 tons of this were run-of-mine and 5,000,000 tons were slack coal. Coke is produced in 22 States; over 13,000,000 tons of the 19,640,798 tons total being made in Pennsylvania. The loss in weight by the coking process was 35 per cent.; but the value of the coke was increased 88¾ per cent. above that of the coal. The bye-products included 104,000,000 lbs. of tar, 12,000,000 lbs. of sulphate of ammonia, 1,500,000 gallons of ammoniacal liquor, and 1172 cubic feet of surplus gas sold. The total value of the bye-products in 1899 was £190,405.

STATISTICS OF MUNICIPAL TRADING.

THOSE of our readers who are interested in the subject of municipal ownership of industrial undertakings, will find much that is worth their attention in an article in the "Economic Journal" for March (Macmillan and Co.), entitled "The Statistics of Municipal Trading." The writer, Mr. J. Row-Fogo, does not concern himself with the theoretical—the political and economic—aspects of the general question, but with "the less wide and less fascinating, but still important, practical problems of gaining a clear view of the present financial position of our municipal reproductive undertakings, and of examining the nature of the information available on this point." As he takes for the purpose of his inquiry the statistics relating to gas-works, "which form the most important branch of this kind of municipal activity," we may well follow Mr. Row-Fogo's arguments at some length. On the first point (that of the present financial position of municipal trading enterprises) the chief question to be considered is: Of the profit stated to be realized by municipal "reproductive" undertakings, how much would in a strict inquiry be deemed to be true profit? Another question arising is: Have the stated profits been arrived at on strict business principles? The figures commonly adopted as the profits of municipal undertakings are derived from the annual returns published by the Board of Trade, and these have been recently supplemented by a special return for the five years 1894-8 made to the House of Commons. But the task of framing these returns "presents many difficulties which cannot be said to have been overcome with great success; and most students who have approached the subject through these channels have probably not pursued their inquiries very far." Since, however, the returns in question have been used by Sir Henry Fowler as the basis of a presidential address before the Statistical Society, they call for further examination.

The average "profit" on all municipal undertakings for the five years ended March, 1898—after providing for repayment of capital, interest, and depreciation—is shown in the official returns as £370,341, calculated by Sir Henry Fowler to be equal to ½ per cent. on the outstanding debt; and this "profit" is entirely represented by that stated to have been realized by corporation gas-works (£370,340), the "profits" on some of the remaining undertakings being counterbalanced by "losses" on others. But, as Mr. Row-Fogo shows, this so-called profit of £370,340, though entitled in the official return "net profit for year," is nothing of the sort, being really merely "the balance arising on revenue account, without consideration of the charges for which provision had still to be made at the time of closing the account;" the only exception being depreciation items, which, having been excluded from the expenditure by the Board of Trade, were included in the five years' return.

The average profit shown by the Board of Trade returns for the five years was £411,313, from which the compilers of the five years' statement deducted (as we have said) depreciation charges (£11,152) and additional debt charges—in all about £41,000—working to the before-mentioned figure, £370,340. This amount of £411,313 is analyzed by Mr. Row-Fogo as follows:—

1.	In relief of rates	£281,615	
2.	In reduction of price of gas	6,467	
3.	Public lighting of streets	1,423	
			£289,505
4.	Reserves or sinking funds (for purposes other than repayment of loans)	£55,861	
5.	Renewals and additions	7,640	
6.	Depreciation	11,152	
7.	Miscellaneous (income-tax, repairs, repayment of loans, &c.)	2,491	
			77,144
8.	Not yet applied, or application unknown		29,716
9.	Carried forward		11,126
10.	Writing off former deficits		6,941
			£414,432
11.	Losses		3,119
			£411,313

How much of this is really profit, in the commercial sense of the word? The first group of items certainly may be so classed. They constitute the benefits accruing to the owners of the undertakings—the ratepayers. Equally certain is it that items Nos. 5, 6, and 7 (amounting to £21,283) should not be classed as profit. In regard to the fourth heading, "Reserves or sinking funds (for purposes other than repayment of loans)," it is not so easy to dogmatize. Mr. Row-Fogo treats the whole of the amounts so set aside as being "expenditure, not profit." They are, he says, "an alternative method for meeting heavy charges which it is not desirable, or not possible, to defray as they arise." He does not, however, bring actual proof of this application of the reserve funds; and, lacking that, it does not appear correct to say more than that, in so far as these funds are used for purposes (such as the reconstruction of works) the cost of which would otherwise fall upon revenue, they should not be counted as "profit," while, in so far as they are applied to the relief of rates when the balance on revenue fails to provide the accustomed dole, they must be classed among the items of "profit."

Then as to the sum of £29,716, "not yet applied, or application unknown." Can this be fairly included as profit? "Examining in detail the separate items we find," says Mr. Row-Fogo,

"that the total, with a single exception, is made up of small sums. They represent the surplus realized by the gas-works of very unimportant boroughs. Many of the items are under £50; half are below £500. Judging from the manner in which other small concerns, for which the returns are able to give particulars, have applied insignificant surpluses, it appears that most of these balances are not dealt with as a profit which can be taken out of the business, but are applied in writing-down plant or in creating a reserve. Many of the very small municipal gas-works are, as a matter of fact, not in a financial position to contribute relief to the rates. Taking other and similar cases as a guide, we cannot estimate at the very most that more than £10,000 is regarded by the corporations as safe profit."

The item £11,126 "carried forward," cannot correctly be classed as profit, being the average of the amounts carried forward at the end of the five separate years included in the returns. The total amount which can be put down to profit is the excess of the balance carried forward at the end of the five years—namely, £7547—over that brought forward at the commencement of that period, which was £3957; the excess being therefore £3590. In regard to item No. 10, that may fairly be included as profit, seeing that the actual losses incurred during the period (£3119) are deducted from the "profits."

The total sum of £370,340 shown in the returns as the average profit on municipal gas-works for the five years 1894-8, may therefore be divided as follows: Correctly classified as profit, £277,096; incorrectly so classified, £37,383; and doubtful, but certainly not all profit, £55,861. Then, however, comes in the further question, Have the undertakings been charged with all the expenditure with which they rightly should have been charged? As is truly said, "governmental bodies who by trading gain a subsidiary revenue, are extremely prone to make their profit appear larger than it really is." When the offices of the gas department occupy the same building as the other public offices of a corporation, is the full proportion of the rent (or of the interest on capital represented by the buildings) charged against the gas undertaking? When the city's solicitor is called in to advise or act for the gas department, is that department charged any costs, or, if any, such costs as would be incurred by a non-municipal undertaking? And what about the assessment to local rates? Does a local authority assess its trading departments at as high figures as it would assess private traders?

Then there is the question of salaries. Upon this point Mr. Row-Fogo is able to give certain figures extracted from about thirty sets of fully detailed accounts, relating to the year 1897-8, supplied to him by the local authorities in response to his application. In all, he applied to about 100 local bodies—all those showing a "profit" of over £500—and got particulars from the number stated, about thirty. As he remarks, it is not improbable that favourable answers to his request were given chiefly by bodies who had reason to be proud of their management; and this fact most probably detracts from the representative value of the figures furnished. Yet out of these thirty "well-managed" local authorities, only sixteen make a charge against their gas-works for salaries; and as regards those sixteen, "the cost of 'salaries and management' per 1000 cubic feet of gas made varies in individual cases from 2·649d. to 0·604d., or a proportion of about 1 : 4."

If, in fact, every item of expenditure incurred by the local authorities, and properly chargeable against their gas-works, had been so charged, the average "profit" shown in the returns would have approached astonishingly near to the vanishing point. But, say the municipal traders, you forget that we are paying off our capital, and when that is accomplished we shall show so much better results. Perhaps. But when will that process be completed? This is what the writer in the "Economic Journal" has to say about the matter:

> The repayment of loans is a less intricate matter; and as the official returns show this outlay in a separate column, we can deal with the country as a whole on this point. The capital sums borrowed for gas-works amount to £22,457,591 and the debt repayment charges (including sums paid in redemption of annuities) to £272,325; showing a rate of about 1·21 per cent. Whether this is the minimum rate authorized by law it is impossible to tell without knowing the terms under which the various bodies have been permitted to raise the money—mostly embodied in Private Acts. It disposes, however, of the current belief that Municipalities are rapidly repaying their loans. Constantly we meet with the argument that the growth of public debt brought on by municipal trading should be discounted by the fact that the loans are being repaid under statutory provisions. Thirty years is the period popularly believed to be required for this desirable operation. As a matter of fact, about three times thirty years will be required if the present rates are maintained.

What have our municipal trading friends to say to that particular little statement?

There is a further aspect of the official statistics of municipal trading; and that is as to whether these statistics are as trustworthy a source of information as might be supposed. Mr. Row-Fogo, in the course of his examination of them soon found that they were not. "Mistakes due to carelessness—arithmetical blunders—are altogether absent; but errors showing lack of knowledge are so frequent as to affect the general value of the figures. Some instances may be given. The tabulated statements show 'Total Receipts,' and 'Total Expenditure;' and by deducting one from the other 'Net Profit' is arrived at. In making up these figures, the treatment of 'stocks on hand' has led to the utmost confusion. Sometimes stock is taken into account, sometimes not; and in the latter case, as the amounts will, of course, not balance, the figures are simply made up to suit. It is hardly possible to imagine a more unjustifiable proceeding in tabulating returns which may be used in investigations relating to public affairs."

As an example of the way the returns have been dished up, in order to exclude the disturbing influence of stocks, the correct and the official figures for the Southport Gas-Works for a year are given:

Receipts	£73,524	Payments	£48,948
Stocks at close of year	5,175	Debt charges	8,438
		Stocks at commencement	14,797
			£72,183
		Profit for year . . .	6,516
	£78,699		£78,699

"Had nothing been said about stocks, the returns would have taken, receipts, £78,699; payments, £72,183; balance, profit. But the returns are supposed to be 'cash' figures; and the disturbing stock had to come out, involving an adjustment of £9622. The course usually adopted is to add such a difference to whichever side requires it (subtractions are, as a rule, not made). But Southport is a case in which more adjustment was thought desirable. £9622 was made a round figure, and brought up to £11,000 and receipts were reduced from £73,524 to £62,524. The remaining difference was taken off payments, which were cooked down to £47,570. Balance, profit, £6516. The taking of such liberties in statistical returns requires no comment." We should think not, indeed.

Other errors of principle in compiling the returns are instanced; but we have quoted enough to show that the indictment of these statistics is a serious one. The sources of these blunders are twofold. Want of technical knowledge upon the part of the compilers of the returns; and want of candour and lucidity upon the part of the compilers of the accounts upon which the returns are based. This second cause of error is, as the writer remarks, an old complaint, but one which it is hardly possible to repeat too often. "By an excessive multiplication of separate accounts, by cross entries and transfers, and the use of obscure technical phraseology, these statements," says Mr. Row-Fogo, and we cordially agree with him, "are often rendered almost unintelligible. They seem designed to satisfy the pettifogging love for technicalities of some book-keeping quack, rather than to afford information for the use of people who, without being accountants, are capable enough of understanding reasonable figures. As a matter of fact, in most instances where the mistakes in the returns seem to be stupid blunders, it will be found that the accounts from which they are taken are such that it would take a professional accountant's careful consideration to grasp their meaning."

It is, moreover, not merely from the statistician's point of view desirable that the accounts of municipal undertakings should be rendered lucid, but also and most particularly desirable in the public interest. "In no department of finance is criticism by outsiders more necessary than in local affairs. Towns and parishes are far less subject to supervision than the Central Government. They do not include among their officials financial specialists like those of departments of the Government; and yet some of the problems to be dealt with are delicate in the extreme. The control exercised by Parliament has also no counterpart in Local Government, although minute scrutiny would be almost more advantageous. It is therefore all the more important that outside criticism should be made possible. At present, complete mystery hangs over almost every one of the more delicate points of local finance."

The thick-and-thin advocates of municipal trading will not find Mr. Row-Fogo's article entirely to their liking; but that is quite the reverse of a criticism upon it. We hope its lessons may be conned by others than the comparatively limited, though influential, circle of readers reached by the "Journal of the British Economic Association."

Chemistry of Carbon.—At the Royal Institution, on Thursday, Professor Dewar gave the second of his course of lectures on the "Chemistry of Carbon." Dealing with the combination of carbon, he showed some examples of exothermic carbon compounds (which, on decomposition, gave out heat), and remarked that such bodies, being characterized by the facility with which they passed into new combinations, were especially important as a basis for organic synthesis. The concluding part of the lecture was devoted to a consideration of the properties of carbon monoxide. It was shown to be formed when carbonic acid was passed through a red-hot tube. Water gas was simply carbon monoxide and hydrogen, formed by passing water vapour over red-hot coke; but in this case heat had to be supplied from the outside. This could be done by admitting air with the water vapour; but then the result—producer gas—must contain a large proportion of nitrogen. The interesting thing about carbon monoxide, the lecturer remarked, was its volatility. It was the most volatile compound known, although it was formed from carbon, the least volatile element. Again, it combined with nickel—one of the least volatile metals—to produce a body which was a gas at quite ordinary temperatures. The next and concluding lecture will deal with the assimilation of carbon.

A POINT IN PATENT LAW.

When one studies the lists of new patents in the Technical Press, or in the Patent Office publications, and sees the great number of new inventions being put before the world in every industry, the question naturally arises in one's mind, How many of these inventions are really useful? The element of utility is the first thing to be looked for, as if that is absent, the Courts will not uphold the validity of the patent. There is, however, considerable confusion in the mind of the public as to the exact kind of utility that is demanded; and as the point is an important one for all those who work patented processes, or who hold patents of any description, it may not be out of place to explain here, by reference to decisions of the Courts, the exact meaning of the term. It happens that one of the leading decisions was given in a case connected with the gas industry—one of the Welsbach cases; and another important decision on the point has just recently been given by the same Judge (Mr. Justice Buckley), in an electro-chemical case, *Atkins and Applegarth v. Castner-Kellner Alkali Company*.

The fact that a patent is invalid unless it disclose an invention which is useful, affords a good proof of the error of the somewhat common impression that our English patent laws are entirely the creation of statute. In none of the Patent Acts is anything said about utility; yet proof of utility is always demanded by the Courts. This demand has its origin in the common law of the land; as in the days of monopolies it was always held that the grant of a monopoly of no utility was an improper grant. Later on, and even of recent years, it was held that a grant of letters patent for a useless invention might be considered "mischievous to the State, to the hurt of trade, or generally inconvenient;" and by the Statute of Monopolies, a grant of such a nature was invalid. Thus it comes to pass that utility is to-day a *sine quâ non* for the validity of a patent.

Utility, however, is a very general term; and it is well to define more accurately the exact kind of utility which is demanded by the Courts. It is probably easier to give a negative definition than a positive one. In the first place, it is not necessary that the invention should prove to be a commercial success, though where there is commercial success there is a very strong presumption in favour of the utility of the invention. It is not even necessary that the invention should have been used commercially; for it might be useful, and yet so expensive as to be commercially useless. And again, as soon as it is patented, it might be improved upon, and only used in its improved form; and in such a case the patent would not be upset simply because no articles were made in accordance with the specification. The leading decision on this important point of commercial utility is that given by Lord Halsbury, as Lord Chancellor, in the case of *Badische Anilin und Soda Fabrik v. Levinstein*, where he said: "The element of commercial pecuniary success has, as it appears, no relation to the question of utility in Patent Law generally; though of course where the question is of improvement by reason of cheaper production, such a consideration is of the very essence of the patent itself, and the thing claimed has not really been invented unless that condition is fulfilled. . . . I will only add that if, in considering generally the requirement of utility, there is an obligation to make it clear that the patent will be commercially successful, and so profitable to the patentee, the burden is so great that no patentee could discharge it." This judgment sets out very clearly the particular case in which commercial utility will be demanded.

An affirmative definition of utility was given in the case of *Young v. Rosenthal* (1 Reports Patent Cases, 34), where Mr. Justice Grove said: "I think, in law, utility means an invention better than the preceding knowledge of the trade as to a particular fabric. It does not mean abstract utility." Referring to this definition in the case of *Welsbach Incandescent Gaslight Company, Limited, v. New Incandescent Gas-Lighting Company* (16 Times Law Reports, 205), Mr. Justice Buckley stated that he would accept it "if the word 'better' be understood as meaning better in some respect, and not necessarily better in every respect. So that, for instance, an article which is good, although not so good as that previously known, but which can be produced more cheaply by another process, is better in that it is better in point of cost, although not so good in point of quality. . . . An invention is useful for the purposes of the Patent Law when the public are thereby enabled to do something which they could not do before, or to do in a more advantageous manner something which they could do before; or, to express it in another way, that an invention is patentable which offers the public a useful choice. . . . A very small amount of utility is sufficient to support a patent." This last clause is of importance. The presumption of the Courts is always in favour of the patentee; and they will be satisfied on the point of utility as soon as a slight advantage of any of the kinds specified by Mr. Justice Buckley in the above judgment has been shown.

It has been necessary to deal with the general question of utility before turning to the most recent decision in the Castner-Kellner case which was mentioned at the outset, because that case comes within the special class where commercial utility is always demanded, and might therefore prove misleading if taken by itself. On the point of utility, Mr. Justice Buckley said, "As regards this patent, the essential utility consists, in my judgment, of two things: First, that the patentees adopting a known process undertake to show the public how to effect on a practical scale that which could be effected before but not on a practical scale; and secondly, that the way they indicate shall be one which effects an economy of power." After examining the circumstances of the case, the learned Judge continued: "The plaintiffs' process was, therefore, in my judgment, not useful as indicating any way of conducting the known process of formation of sodium amalgam and caustic so as to attain an efficiency greater than that attained by previous methods." He then dealt with the second point, economy of power, and found upon the evidence that no such economy was obtained. He therefore found that the plaintiffs failed upon utility. In this case, want of commercial utility upset the patent; because commercial utility was what the patentees had in view, and declared to be their object. Thus they brought their patent into that class of which Lord Halsbury spoke in the judgment already quoted—patents aiming at cheaper production, where the thing claimed has not really been invented unless that condition is fulfilled. So far, therefore, as utility alone is concerned, a very fair test of whether or not a patent would satisfy the Courts may be made by asking two questions: (1) Does it do, when put into practice by a competent man, what it assumes to do? (2) Does it provide the public with a useful choice? If the answer to both questions is in the affirmative, the Courts will be satisfied.

ELECTRIC LIGHTING MEMORANDA.

Three-Phase Electric Power for Factories—Unprofitable Electricity Supply in South London—Some Irregularities in the Electrical Profession.

An instructive account of progress in the polyphase equipment of actories was recently given by Mr. W. Wyld to the Birmingham Section of the Institution of Electrical Engineers. The author of the paper is connected with the electrical power equipment of the Patent Shaft and Axletree Company's works at Wednesbury; and his statement of what is going on there sheds a strong light on the various schemes that are being put forward at the present time for generating and distributing power "in bulk" by different agencies. At the works in question, there is already a plant of 420-horse power, consisting of two direct-coupled high-speed generators of 210-horse power each, and some 30 motors, varying in size from 50 to 5 horse power—the small ones being in use on travelling cranes. The power house is designed to eventually accommodate 2000-horse power. There are four Babcock and Wilcox water-tube boilers; and the coal is tipped direct from the railway siding into the bunker opposite the fronts of the boilers. The same machines supply power and light the works. The existing shafting has been split up into smaller units, for greater economy in driving; and the transfer from steam to electric driving was made without stopping any of the shops. Referring to some of the evidence given before Parliamentary Committees respecting the cost of power and the influence of the load-factor, Mr. Wyld remarks that he gets a very good all-day load on his station, the load-factor for the past year being 42 per cent. With an output of 554,000 Board of Trade units per year, the works cost of generation stands at the extremely low figure of 0·552d. per unit. This is for coal, water, wages, oil, and stores. With the cost of distribution added—that is, the wages of the motor attendants, crane men, and lamp trimmer—the total works cost of the energy delivered at the shafting or the machines is 0·767d. per Board of Trade unit.

A considerable amount of interest attaches to the public electric lighting enterprises of South London, having regard to the nature of the competition which such ventures have to meet at the hands of the South Metropolitan Gas Company. One of these concerns, the South London Electric Supply Corporation, Limited, has its accounts vivisected in this week's "Electrician;" and a harrowing performance it is. This Company was almost singular in engaging to work a combined dust-destructor and electricity-generating station. This combination is usually a speciality of local authorities, who are not businesslike, and are prone to believe the word of commercial travellers in this line. Companies, as a rule, are better advised; but the South London "Corporation" must be regarded as forming an exception. However, the Directors know better now. They started their dust-destructor about the beginning of last year, and kept it on until the end of October, when, in consequence of legal proceedings having been taken against the Company for "alleged effluvia from the chimney," it had to be shut down. Probably the Directors were not sorry to be quit of it, although it heavily loaded their capital account. The Directors have to pay a return upon a capital investment of £325,000; and the total revenue so far is £17,721 a year—being at the rate of 3·4d. per unit sold. It is a young business yet; but there is plenty to be done in making up the deficiency of profit. Last year the working profit was a minus quantity, amounting to −0·375 per cent. on the mean capital expended. The Directors get £1200 a year for managing this brilliant venture, and doubtless earn it.

Occasionally when the trouble of what is summarized as "the traders" is discussed among gas engineers, a moral is pointed in respect to the happy family of electricians, where consulting engineers and contractors appear to live together in great accord and the odour of sanctity. It is obvious that there is this mixing

of profession and trade among electricians, and envious gas managers, who know how it has been with themselves, have experienced a feeling of abasement at the apparent blamelessness of the actual state of things in the electrical household. Naturally, if the average gas manager does not look up to the electrician as to a superior being, it is not for want of being frequently told by the electrical journals that such is his only proper attitude in face of so ineffable a character. In the circumstances, therefore, it is a disillusionment to learn on the same authority that the practice of consulting electricians and of certain manufacturing firms in this industry is not impeccable. The "Electrical Review" rather more than hints that the marvellous "go-aheadness" of electrical firms of foreign origin, which is frequently belauded in the newspapers, is largely due to the fact that bribery and corruption on the largest scale "form part of their distributing system."

It is declared that British manufacturers who will not stoop to this way of securing trade are, for the time being, and until the invariable process of clarification works itself out, at a grave disadvantage in face of their pretentious foreign rivals. But this is not all. There is in the British electrical world a personage, known as the consulting engineer, who is unknown elsewhere. The electrical consultant is a curious anomaly, inasmuch as while he will accept an engagement as an independent expert, he may also have intimate relations with particular manufacturers. Or a contractor may occasionally figure as a consulting engineer. This is frequently done; with results that are more instructive to the observer than satisfactory to the clients. Yet again, a gentleman who sometimes advises and sometimes constructs, has been known to obtain appointments in a consulting capacity by representing to his people that he can buy for them on better terms from manufacturers (being himself "in the trade") than they could obtain without his assistance. The trick hardly seems professional etiquette; but then, electricians are a peculiar people.

THE INSTITUTION OF GAS ENGINEERS AND THE AMALGAMATION QUESTION.

The Secretary of the Institution (Mr. Thomas Cole) forwards the following letter as a reply to the communication addressed to him by the Secretary of the Gas Institute (Mr. Walter T. Dunn), on May 4, as given in the "JOURNAL" for May 7, p. 1204:—

11, *Victoria Street, London, S.W.*,
May 29, 1901.

W. T. Dunn, Esq., Secretary,
The Incorporated Gas Institute,
13, Victoria Street, Westminster, S.W.

Dear Sir,—Your letter of the 4th inst. has been carefully considered; and I am desired by my Council to say that they do not see how, in reporting on the Amalgamation Scheme, they could have defined the position more clearly than by presenting to the members a complete copy of the whole of the correspondence which had passed between the two Associations. They are also of opinion that there can be no doubt as to the true intentions of the members of the Institution of Gas Engineers, and that a distinct and clear vote was given at the meeting upon the various points at issue.

The true principles upon which the Institution is prepared to continue negotiations were clearly enunciated by the President in his opening remarks—his views being endorsed by the members present; and while my Council are most anxious that the gas industry should be represented by one technical body, they feel convinced that an Association formed on lines other than those indicated would eventually be productive of trouble and dissatisfaction.

My Council feel that the difficulty with regard to the exclusion from the proposed new Association of certain members of the Institute, who would be ineligible under the new rules, could be met on the lines indicated by Mr. George Livesey—*e.g.*, by the election as Honorary Members of those gentlemen who had previously occupied the presidential chair, and also of such gentlemen who had rendered distinguished service to the gas industry.

With regard to dissolution, my Council have always considered this a *sine quâ non*; and they see no reason to alter their views, while they believe that the question of title of the new Association could safely be left to the vote by ballot by the members of both bodies, possibly after certain names had been submitted by the two Councils.—Yours faithfully, THOMAS COLE, Secretary.

Patents in the Past Year.—The report for 1900 of the Comptroller-General of Patents, Designs, and Trade Marks has been issued as a Parliamentary Paper. The number of applications in respect of patents again shows a falling of. The highest point was reached in 1897 with 30,952; in 1899 there were only 25,800; and in 1900, 23,922. The total receipts increased from £225,701 to £226,091. The fees amounted to £204,140, against £202,977 in 1899. The renewal fees came to £134,686, compared with £128,553 in 1899. The total expenditure dropped from £123,217 in 1899 to £120,667 last year. The surplus of receipts over expenditure in 1900 stood at £105,424, compared with £102,484 in 1899.

PERSONAL.

Mr. R. HESKETH JONES was yesterday elected Chairman of the European Gas Company; Mr. N. E. B. Garey having resigned in his favour.

Mr. FRANCIS H. WOOD, Assistant to Mr. J. Fred Wicks, the Engineer and Secretary of the High Wycombe Gas Company has been selected to superintend the erection of the new gas-works at Shirebrook, Notts., and after their completion to take the management.

Dr. G. E. RICHMOND, B.A., B.Sc., M.B., B.S. Lond., &c.—brother of Mr. E. W. T. Richmond—has, we learn, been selected by the Countess Howe to proceed to Cape Town to take up the post of Principal Medical Officer of the new branch of the Imperial Yeomanry Hospitals at Elandsfontein. Dr. Richmond is due to sail from Southampton to-day (Tuesday).

Dr. KARL AUER VON WELSBACH has been made a Baron by the Emperor of Austria, in recognition not only of his inventions but of his numerous scientific works. Having benefited the gas world by his incandescent gas-mantle, he is now devoting his energies to the improvement of electric lighting; and his latest invention—the "osmium lamp"—is expected by sanguine people to play the same part in electricity as the Welsbach light has played in gas. Baron Auer is forty-two years old.

The President of the Board of Trade has appointed Mr. FRANCIS J. S. HOPWOOD, C.B., C.M.G., to be Permanent Secretary to the Board, in place of the late Sir Courtenay Boyle. Mr. Hopwood has so far been Railway Secretary under the Board of Trade. A daily contemporary says that Mr. Hopwood is an official of "parts and ideas," and if he will eschew a sentimental hankering after counsels of perfection, and set his face against all dilatory and dilettante dealing with practical questions at the Board, he may carn himself a very enviable reputation.

OBITUARY.

The death is announced of Mr. S. A. MORTLOCK, the Chairman of the Haywards Heath Gas Company. Deceased suffered from a weak heart; and his death occurred suddenly on the 25th ult. He was 68 years of age.

The friends of Mr. John Eunson, the Engineer of the Northampton Gas Company, will hear with regret of his bereavement by the death of his son Mr. HENRY JOHN EUNSON. The sad event took place in India last Tuesday, where for some time deceased gentleman had been engaged in making surveys and working manganese mines. For several years previous to going to India, he was in the service of the Northampton Gas Company, under his father; and at the works his geniality and courtesy established him a favourite with all classes of the emyloyees. He made geology his special study; and it was through his accomplishments in this direction that he obtained appointments to make surveys of certain States in India. Deceased was only 39 years of age.

NOTES.

Examining the Incandescent Bodies of the Welsbach Mantle.

The "Chemical News" abstracts a communication by Messrs. Muthmann and Baur to the "Berichte," Vol. XXXIII., p. 2028. Starting from the fact that impurities considerably diminish the illuminating power of the incandescent substance used with the Auer burner, the authors took some commercial nitrate of thorium, and, to its solution, brought to boiling point, they added drop by drop a solution of bichromate of potassium, so as to effect a fractional precipitation. The first portions which came down consisted of a beautiful deep yellow microcrystalline precipitate of pure chromate of thorium, $(CrO_4)_2Th + 3H_2O$. It is only the very last portions which gave a dirty olive-green precipitate, or even no precipitate at all. They either no longer contained any thorium, or only foreign oxides containing perhaps 0·3 per cent. of nitrate of thorium. The thorium thus purified was incorporated with 0·01 per cent. of peroxide of cerium, and then used for impregnating mantles. These turned out to be much more brilliant than the ordinary commercial ones, with more of yellow and less of green light. Their illuminating power was 1·3 to 1·4, taking as unity the "metathor" mantles made by Drossbach, of Freiberg. In the manufacture of mantles with well purified thorium, therefore, as the cerium is only present in small quantities, its preparation does not require such care.

Vitrified Quartz.

An interesting discourse upon vitrified quartz was recently delivered at the Royal Institution, by Mr. W. A. Shenstone, F.R.S. This substance has already been experimented with by Professor C. V. Boys and others, who have made small tubes and spun fibres of it. Its chief use is in the manufacture of optical instruments, and for the well-known "pebble" spectacle lenses. It possesses many qualities desirable in apparatus intended for use at temperatures above the melting point of glass; but it is difficult to manipulate. In its natural state it splinters immediately upon

contact with a flame, and therefore has to be subjected to a preliminary annealing stage. Mr. Shenstone's next difficulty was with the oxy-gas burner. Vitrified silica only becomes sufficiently plastic for working when it is above the melting-point of platinum, and it cannot be heated sufficiently in all parts of an oxy-gas flame. What is wanted is not so much a very large flame as one which presents a very hot spot; this being situated just beyond the inner blue cone of the flame. The burner that suited Mr. Shenstone best was the injector burner of Mr. Jackson, of Manchester. The rough rods of melted silica are made by sticking pieces together, and pulling the whole out lengthwise. A sufficient number of rods put together in a ring makes a tube; and so on. Articles made of it keep their shape at a temperature at which platinum melts and runs; but the exact figure is not known. It can be transferred from the oxy-gas flame to cold water without cracking. One discovery that silica tubes have already helped in the making is that nitric peroxide may be produced by heating a mixture of oxygen and nitrogen above the melting point of platinum. Hitherto no direct combination of oxygen and nitrogen has been effected without electric action.

Electric Power in Coal Mining.

Mr. H. Ravenshaw has read a paper before the Institution of Electrical Engineers on some experiences in connection with applications of electric power to coal mining. It appears to be agreed that electric power has proved somewhat disappointing in respect to underground working. When it was first made available, it seemed to be the ideal means of carrying power to the assistance of the miner, and to be free from the obvious shortcomings of older systems. In practice, however, electric power transmission in coal mines was found to possess drawbacks. The first in importance of these is the liability to sparking, which cannot be eliminated from either conductors or moving machinery. Electric machinery cannot conveniently be completely enclosed, on account of the heating which attends its operation. Owing to these and other difficulties, the introduction of electricity into coal mines has not been anything like so rapid as was anticipated. Where this has been done, troubles have arisen which no electrician, not being a coal miner, could have foreseen. Coal mining, besides, is an industry which is peculiarly intolerant of breakdowns. The hours during which winding goes on are so few that no interruption of the operation can be permitted. The machinery must be kept going, no matter at what cost; and therefore the mining engineer prefers the appliances that will continue to work somehow under the greatest disadvantages, to those that break down. The laying of the pit idle is the greatest of all possible extravagances; and nothing that can happen to the working machinery matters much in comparison with a suspension of the output. Breakdowns being a besetting weakness of electric machinery, the fact supplies a sufficient explanation of the slowness of the adoption of this kind of appliances by colliery proprietors. At the same time, progress is being made in this department of electrical engineering, as is indicated by the welcome that is being extended in certain mining districts to electricity-in-bulk generating schemes.

Steam-Boiler Practice—Mechanical Draught.

Writing in the "Engineering Record" on the design of steam-power plants, Mr. Henry C. Meyer lays down the proposition that there are two independent factors that determine the efficiency of a steam-boiler. One is the efficiency of the heating surface, or its ability to transmit to the water the heat to which it is exposed; and the other is the efficiency of the furnace, by which is meant the amount of heat actually contained in each unit volume of furnace gas compared to the theoretic maximum. A high surface efficiency means that the heating medium shall be at the highest possible temperature; because the rate of heat transfer is some function of the difference of the temperatures on the two sides of the boiler plate. The greater the difference the more heat per unit of surface will be transmitted. A high furnace efficiency is a function of the correct air supply, nothing more nor less. The relative thickness of the bed of fuel on the fire-grate is a matter of the nature of the fuel; but the more of it that is properly burnt within a given time the better for the efficiency of the boiler. This again depends upon the draught. In respect to mechanical draught, Mr. Meyer pronounces in favour of the induced as compared with the forced draught systems; and for fan draughts instead of steam jets. The latter possess an incidental advantage in helping to prevent the clinker from sticking to the bars. The writer cites experiments made by the Board of Steam Engineers of the United States Navy, to prove that with five different types of steam injector blowers, the consumption of steam was from 8·3 to 21·2 per cent. of the steam made in the boiler to which the jet was applied. Draught can be obtained from fans for only a fractional part of these amounts—say, from 1 to 5 per cent. of the total steam generated. As compared with chimneys, Mr. Meyer prefers fan draught, because it is greater, and enables economizers to be used in the smoke-flues. Again, the greater power of fan draught enables cheap, poor fuels to be used. The Sturtevant Company have published a book on the general subject. Mr. S. C. Davidson, of the Sirocco Engineering Works, Belfast, claims that his fans possess the peculiarity of discharging the air from the tips of the blades at approximately 80 per cent. higher velocity than that of the blades themselves.

COMMUNICATED ARTICLE.

GAS MATTERS IN THE UNITED STATES.

Ohio Gaslight Association Meeting.

By the time you receive this, I presume you will have already prepared your usual summary of the proceedings at the recent annual meeting of the Ohio Gaslight Association (which I duly attended), at Dayton, Ohio. It was a very interesting gathering. The hall chosen (that of the Cash Register Company) was probably the best available room; but it was certainly far from an ideal one. The acoustic properties, not by any means the best, seemed at times to exasperate the feelings both of speakers and spoken to. Otherwise, there was nothing to mar the good feelings of all concerned.

Taken as a Society, it was local—indeed, so large is Ohio that such a Society could well be local, and yet have an enormous field of interesting topics. As a State containing mines of iron and coal, as well as furnaces for using them, with oil-fields and natural-gas wells to add variety, the industries dependent upon native and manufactured gas are great indeed. Taken as a gathering of men, it was almost cosmopolite. For the reason just given, the interests were widely scattered, and so is its membership and its membership's education. By convention, all Americans are "educated gentlemen," only some more so than others; and so here all men were skilled gas engineers, only some more so than others.

In "Hard Cash," Charles Reade remarked: "The Universities have the small ambition, after having shut out the rest of the world, in the University boat race, to contend each with the other for the championship." But in Ohio they have more lofty ambitions. They are exponents of an ideal best, summed up in the words of Louis, "After us, the Deluge"—only the Ohio man says, "Beyond Ohio, nothing." He really believes it. He shows this in everything said and done. To him Ohio is a microcosm; nor will anyone familiar with the history of the State much wonder that he thinks so.

This feeling, which in the U.S.A. goes by the name of "The Ohio Idea," was prominent in the hotel lobbies the night before the meeting; and more than one bottle of wine—home grown, but better far than much of that used in France, *crede experto*—was opened to offer a libation to the future of the State and the Association.

Coke-Oven Gas Plants.

I should like to return for a few words in regard to the bye-product oven. There seems to be a rapidly growing feeling of antagonism between the advocates of the new system and the men who regard the coke as the bye-product and the gas as the important end in view, *vice* the inversion. What this will amount to, and why the rivalry should exist, I can by no means clearly see. But it does exist, and we are going to hear a great deal more of it before we hear any less. For my own part, I cannot see the necessity for this rivalry. It can have no meaning, unless the gas company are doing business in a place where oven coke is in demand, in which case it may pay the owners to change their manufacturing method. Nor can it do any good for certain ultra-conservative men to attempt for any cause to try and stem the tide. If oven coke can be made from a grade of coal which will not make gas by ordinary methods, and if this coke can be sold at a price which will compete with anthracite coal, then, since a smokeless fuel is a *sine quâ non* in an American town, the question is fully answered—it will pay. All the rest of the discussion is simply empty words; sound and fury signifying nothing, no matter what may be the experience of the man who writes about the future or the past.

Pumice Gas-Fires.

I note Mr. Fletcher's criticism of my letter; but it would be interesting to know where he got his figures. "Pumice," in this connection, is a substance resembling fire-brick, but rather more porous, used for lining the furnaces in which car-wheel tyres are annealed. It has no more connection with the product of volcanic activity than with that of the cider-mill. I am surprised to note that all three words are spelt alike; but the signification varies from a "form of fire-brick," "a silicious rock," to "the waste of a cider-mill or wine-press."

During the past few weeks there has been remarkably little of interest happening locally. The proposed coke-oven plant on the mainland at the junction of the Harlem and East River still rests *in statu*. How soon it will develop further, I cannot say; but I am inclined to think, from what I hear, it will not be very long.

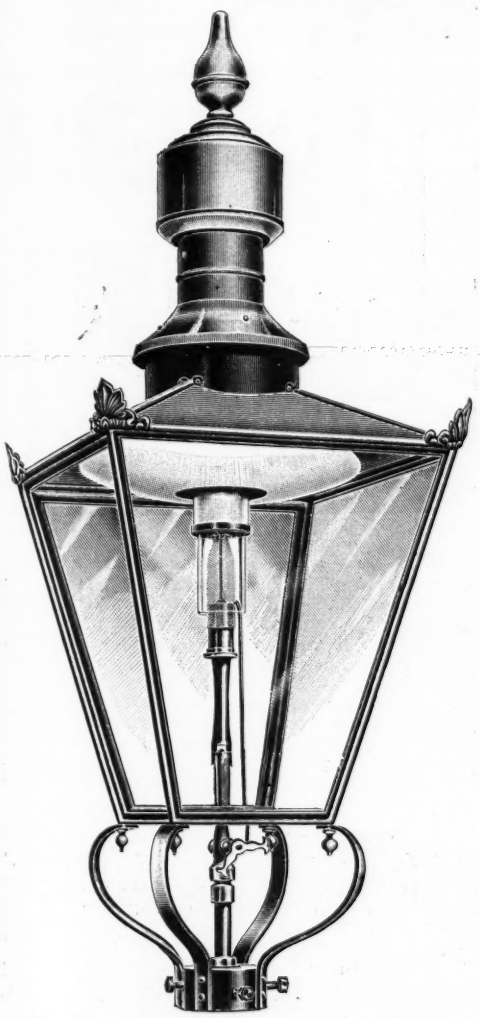
The Southern District Association of Gas Engineers and Managers will hold their annual excursion meeting at Bournemouth, on Thursday, the 20th inst.

Mr. Porter's Gas Institute Paper.—Mr. Robert Porter, of Elland, informs us that the title of his paper for the Gas Institute meeting next week (which was not determined when the programme of arrangements, notified last week, was issued) will be "British Water-Gas Practice."

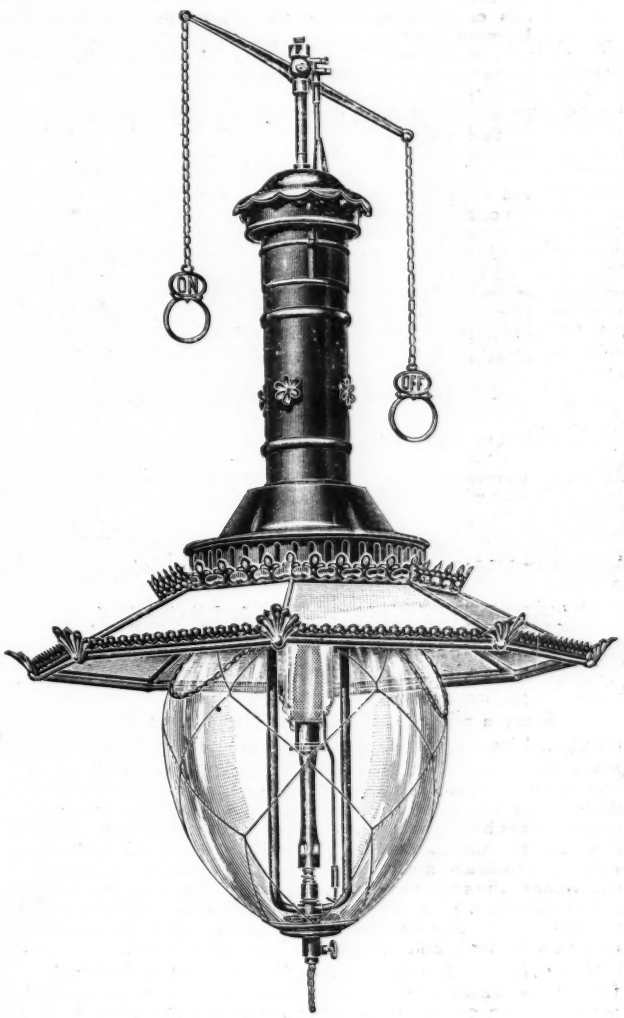
TECHNICAL RECORD.

THE SIMPLIFICATION OF HIGH-POWER INCANDESCENT GAS-LIGHTING.

The constant development of means whereby a high duty is obtained from gas through the bunsen burner and the incandescent mantle is, and will always be accounted as, one of the remarkable features of the gas industry in the closing years of last century and this opening year of the new. As one takes a glance backwards over the rapid progress (undreamed of only a few years since), and then meditates on the position attained to-day, one wonders whether the store of possibilities in incandescent gas lighting has been exhausted, or, if not, when we shall reach finality. Who among us thought ten years ago, and even less, that, by the aid of the incandescent mantle and an increased gas pressure, an efficiency of from 30 to 35 candles per cubic foot of gas consumed would ever be obtained? How many among us thought ten months ago, or even ten weeks ago, that a burner consuming approximately 10 cubic feet of gas, and yielding an efficiency of (say) 27 or 28 candles per cubic foot of gas consumed, *without the assistance of any auxiliary pressure-pumps or gas-pressure raising device*, was within the region of possibility? We venture to say there were but few. And yet it is an accomplished fact to-day. Not many, if any, of the engineers of the industry have allowed their imagination to run riot to the extent of expecting that ere long a higher efficiency than present-day achievement could be secured per cubic foot of gas; but there are many who have looked and hoped for the simplification of the means whereby that high duty, or something approaching it, would be obtained. They have not looked in vain; for to-day the Welsbach Incandescent Gas-Light Company have in their possession a lamp which is simplicity itself, and which, with gas at an ordinary pressure, will return to



THE NEW HIGH-POWER LAMP FOR STREET LIGHTING.



THE ARRANGEMENT AS ADAPTED TO INTERIOR LIGHTING.

the user a lighting value of about 27 or 28 candles per cubic foot of gas consumed—that is to say, with gas at 2 inches pressure, and a consumption of 10 cubic feet an hour, the illuminating power derived from the lamp is, the Company's photometrical tests prove, equal in round figures to 280 candles. For the accuracy of these figures, the Company's representatives vouch; and having seen the light, we have no ground for doubt. The lamp is a distinct advance—we do not say in efficiency per unit of gas consumed, but in the displacement of complexity in attaining a high degree of excellence. In this opinion, we are glad to have the confirmation of one whose word we esteem.

The construction of the lamp (which is to be known as the Welsbach-Kern automatic intensifying lamp) is so simple, that it is singular the road to its discovery has been so long. But it was ever thus with most classes of machinery. The credit for the improvement is due to the Engineers of the Welsbach Company (Messrs. C. G. Brett and F. Henneberger); but the lamp is the property of the Company. In explaining its construction, we will first make reference to the burner. This is of the Welsbach-Kern type; and it is designed to pass about 10 cubic feet of gas per hour. In the head of the burner is a perforated inner cone; and this has been formed so as to occupy as small a space as possible, in order to keep the head of the burner within reasonable compass, and yet give sufficient perforations to pass as much of the mixed gas and air as is needed. Within this perforated cone is fixed, with its apex towards the burner tube, a solid metal cone, which has to some extent the effect of maintaining the original velocity of the mixture, and renders further assistance in preventing the burner lighting-back. The perforated cone is surmounted by a wheel with straight-cut teeth, instead of diagonally-cut teeth as in ordinary Welsbach-Kern burners. The whole of the head portion of the burner is enclosed in a cylindrical outer case with a thickened ring at the top, so as to afford the mantle a comfortable seat, and prevent it being cut away. The outer case is fastened to the platform of the bunsen tube by means of a special bayonet joint. This joint simply consists of three inclined planes on the platform, and three lugs stamped on the outer cone; so that it is much more easily fitted and taken apart than with the screw joint. The burner top is only a trifle larger than that of a No. 4 Welsbach-Kern burner.

Now we come to another simple portion of the arrangement, which, modest as it is, plays a very important part in stimulating

the mantle to extreme incandescence. The burner is surmounted by a short metal chimney, to the bottom of which is attached a cylindrical glass very much like an ordinary mantle protector. As will be evident by a glance at the illustrations, the glass depends securely from the chimney without a visible holder of any kind to throw a shadow; and it is suspended about, or rather less than, an inch over the top of the burner. Very careful measurements have proved that with the special burner used, there is almost perfect combustion of the mixture of gas and air, and that the whole flame (although 10 cubic feet of the mixture is passing through the burner) is condensed within the small space of a No. 4 mantle. The mantle is thus subjected to an equally high temperature all over; and this, with the great exciting rush of air over the surface (induced by the chimney) produces the remarkable volume of light obtained.

On the occasion of our inspection, we were afforded an opportunity of examining each part of the new lamp, of judging the character of the flame at normal pressures as a proof of the completeness of combustion, and then comparing it with the flame of a Kern high-pressure burner supplied at 8 and 10 inches pressure. In this comparison, it was difficult to distinguish any difference between the two, save that if anything the flame of the new lamp burner was the more shapely for use within a mantle. It was not therefore surprising to find that, when fitted up in the lantern complete, there was an equally intense incandescence all over the mantle; and a little sceptical feeling which we first had that such high results as were claimed could be achieved by such simple methods was dissipated. The arrangement can be fitted to any shaped lantern, as the illustrations show. There is nothing at all unsightly about it; and there is an absence of any annoying roaring noise. The lamp has been under continuous trial now for some time; and the faith in it of the officials of the Welsbach Company has been strengthened. The apparent delay in prominently promulgating information about it has, we have reason for believing, been due to the time absorbed in completing the experiments and the formalities in connection with the British and foreign patents.

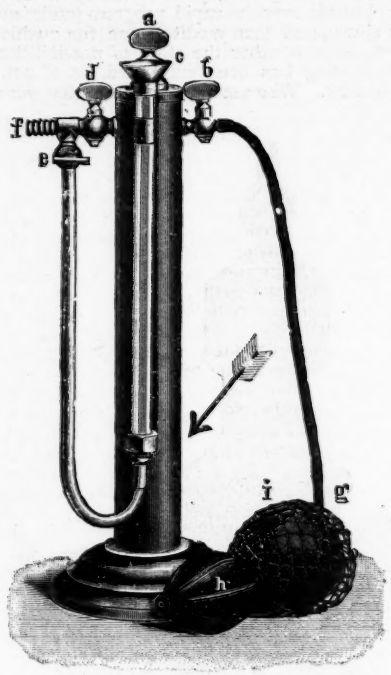
The chief point to be borne in mind is this—that the lamp effectually disposes of the idea that, to secure high power, it is absolutely essential to have gas at high pressure, though with increased pressure a few candles greater efficiency may be derived per cubic foot of gas consumed. We hope that time will prove that we have not over-rated the lamp; we do not think it will. Simplicity of construction should mean comparative cheapness; and it will rest with the Welsbach Company to make the lamp a success for themselves and useful to the gas industry. Already one or two public installations have been arranged for—one of them being the lighting of the sea-front at Herne Bay.

THE DETECTION OF GAS LEAKAGES.

A serviceable addition to the equipment of the outdoor department of a gas-works, and in fact of any gas-fitting establishment, will be found in a new gas-leak detector which has been shown to us, and its usefulness satisfactorily proved, by Messrs. Falk, Stadelmann, and Co., Limited, of Farringdon Road, E.C. It is not only a detector but a locator; and as such it will be found of particular value in the inspection of gas-piping in new property, of the fittings before being fixed, and of the completed installation—in fact, its uses are varied. The pressure which the appliance can bring to bear on the piping and fittings being much greater than that of the ordinary gas supply, the smallest leakages can be readily detected. The character of the appliance will be seen in the illustration. It is light; and, when enclosed in a box, it can be easily carried by hand from place to place as required.

The "Wizard" detector (for so it is called) can be first used to test the soundness of the installation or fitting by the pressure of air acting on a column of water in the glass tube affixed to the body, as shown in the illustration. If the level of the water remains stationary, there is no leak; if it drops, it proves there is a leak, as a portion of the air which was supporting the column has escaped. In the latter event, an important part of the arrangement is brought into service. In the cylindrical body is a tube, which is supplied with benzoline in quantity sufficient for several tests. By means which will presently be more fully described when explaining the action of the appliance, air is passed over this benzoline, and thus forms a combustible gas with which the pipe system or the fitting under test is charged. When this is done, the application of a light along the pipes and fittings will soon reveal the situation of the trouble. A more intimate idea of the operation and construction of the appliance will be gathered if we briefly explain the method of conducting a test.

First of all in testing for soundness, the apparatus must be joined at the outlet *f* by means of a flexible tube to the inlet of the installation or fitting to be tested, at the same time closing all other taps or outlets. Then open taps *d* and *c*, close tap *b*, and (through the funnel *c*) fill the glass tube with water approximately to a line indicated on the tube. Next inflate the rubber bag *i* with the bellows *h*, and open the tap *b* slowly until the water has risen to three-fourths the height of the tube. If, as already said, the water column then remains stationary, the fitting or system under test is sound. If the water column falls, there is a leakage in proportion. The leakage being proved, the next duty is to locate it. The reservoir in the cylindrical body having been previously supplied with benzoline through the filling screw *a*, the rubber ball *h* is again operated, and gradually the whole installation is charged with the gas produced by the ingenious arrangement within the body of the appliance. The operation is continued until it is ascertained, by means of a light, that gas has reached the end of the system under test, and then, while the bellows *h* is still being operated, a light can be applied along the the pipes until the leak is found. In cold weather, the apparatus should be heated during use, at the point indicated by the arrow, with a blow-lamp or other means, in order to cause the benzoline to vaporize more quickly.



The apparatus is so simple and effective that any fitter, after a few minutes' explanation, would be able to use it, and would thenceforth find it a valuable companion. An apparatus of the kind applied to new piping and fittings would prevent the frequency of complaint of "a smell of gas" which one hears when moving among consumers—particularly in middleclass houses, which builders and gas-fitters appear to regard as a proper field for shoddy work. In the case, too, of repairs or additions to an old system, by the disconnection of the outlet-pipe from the meter, and the employment of a test of this sort, we should hear less of those little damaging explosions which are the outcome of carelessness on the part of fitters.

Gas Supply in Italy.—According to Dr. Scavia, in "L'Industria," the first gas company in Italy was founded in Turin in 1838. In the following year, Venice made a contract with the Lyons Gas Company; and by 1840, Turin had some thousands of burners in operation. The streets of Milan were illuminated in 1845. Then came Verona, followed by Genoa, Florence, Leghorn, Palermo, and finally (in 1853) Rome. Dr. Scavia a short time ago carried out some tests of the gas supplied by the Turin Gas Company and the Turin Consumers' Company, and found that the chemical composition and calorific power agreed fairly well with those of the gas of Berlin, Zurich, Paris, London, and New York, except that the gas sent out in the last-named town contained a high percentage of carbonic oxide, probably due to the admixture of water gas.

Origin of Coal.—The recent presidential address of Mr. E. B. Wethered to the Cotteswold Naturalists' Field Club has a certain interest to our readers, as the author dealt therein with the origin of coal and the extent to which the coalfields of Great Britain have been worked. He pointed out that the extent of our present exportation of coal was not contemplated by the Coal Commission in 1871. In 1867 the quantity of coal exported was 10,233,135 tons; and it was thought that no considerable increase would take place, whereas nearly 56,000,000 tons were exported in the year 1899. In the matter of home consumption, however, the Commissioners were remarkably correct; their estimate for 1899 being 162,400,000 tons, and the actual figures being 164,284,757 tons. Mr. Wethered suggests that another Commission should be appointed to consider the probable duration of the coalfields. A further point on which information is required is, he says, as to what natural stores of coal are under the secondary rocks, and at what depths, as it is of national importance that this information should be obtained.

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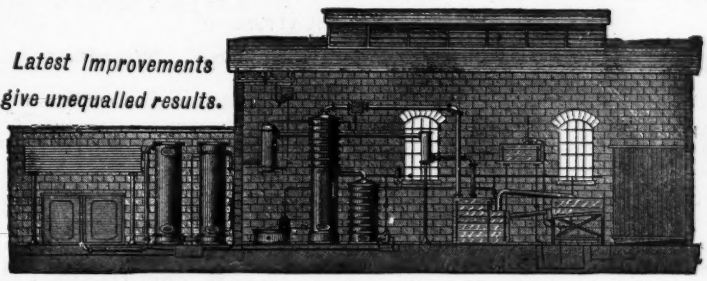

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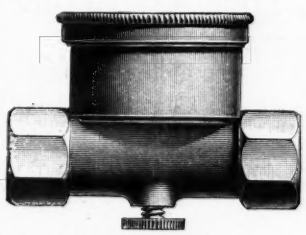

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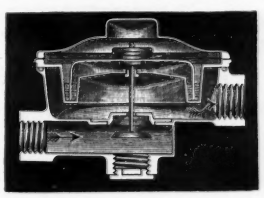

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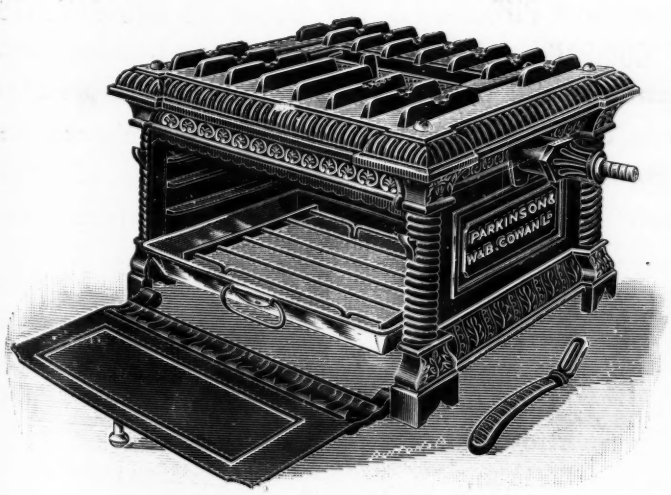

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A NEEDFUL NOTICE

TO ALL WHOM IT MAY CONCERN.

We hereby intimate to Chairmen and Members of Gas Committees, Engineers and Managers of Gas-Works, that we have **PURCHASED THE BUSINESS AND PATENTS OF THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED,** Westminster, London, and are now the Sole Owners of the Patents of the pre-eminently successful system of Self-Acting Conveyors and Elevators in combination with the Storage Hoppers, the Measuring Chambers, and the Charging-Shoots, forming together the much admired and happily-designated "powder-pouch" method of charging Inclined Retorts, now in operation, or in course of erection, at—

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DESCRIPTION OF A GASHOLDER AND TANK ERECTED AT THE HULL STATION OF THE BRITISH GASLIGHT COMPANY,

WITH SOME PRACTICAL SUGGESTIONS ON CONSTRUCTION.

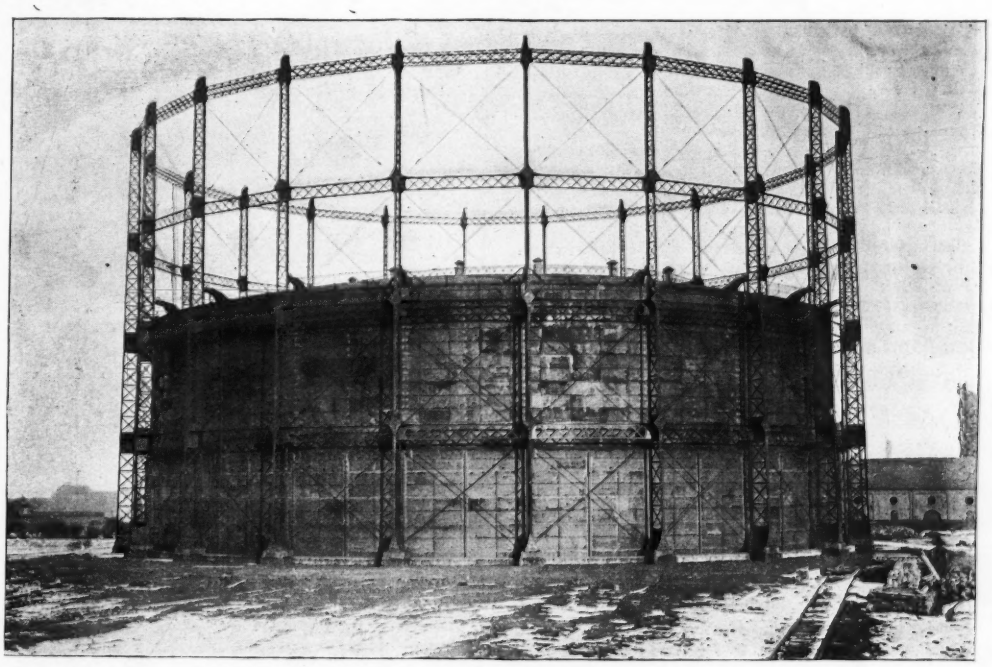
By Joseph Wentworth.

The writer has thought that an account of the carrying out of a work of this size may, perhaps, be interesting and useful to the profession, as difficulties met with, and the mode of overcoming them, are always instructive. The general dimensions of the holder are as follows:—

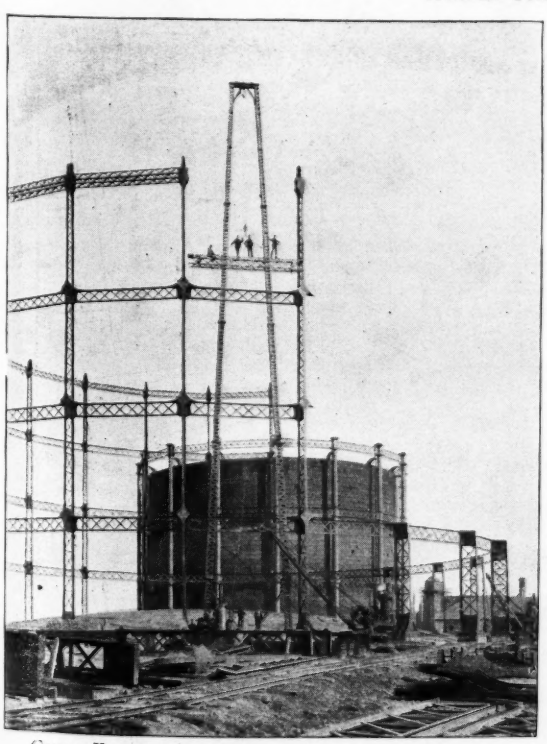
Tank, 203 feet diameter by 40 feet deep to rest-stones.	
Outer lift	200 ft. $1\frac{7}{8}$ in. by 40 ft. deep.
Middle lift	197 ft. $6\frac{3}{8}$ in. by ,,
Inner lift	194 ft. $10\frac{7}{8}$ in. by ,,
Effective capacity. . .	3,557,000 cubic feet.
Pressure, one lift . . .	$4\frac{5}{10}$ inches.
,, two lifts . .	$6\frac{6}{10}$,,
,, three lifts (total)	$8\frac{1}{2}$,,

The site of the tank was on an old brick-field; and all the top bed of clay had been removed. One half had been made up with the surplus soil from another gasholder tank; the other half was at 5 feet lower level, and a swampy marsh was eventually filled up with the surplus from the new tank.

Four trial holes were sunk, to test the subsoil. Good, strong clay was reached at about 18 feet from the higher level, and chalk was touched at 41 feet; and as it was advisable to keep well above this, the tank was built 8 feet above the surrounding level. Even then, the excavation at the well-hole came quite near enough on it to be safe.



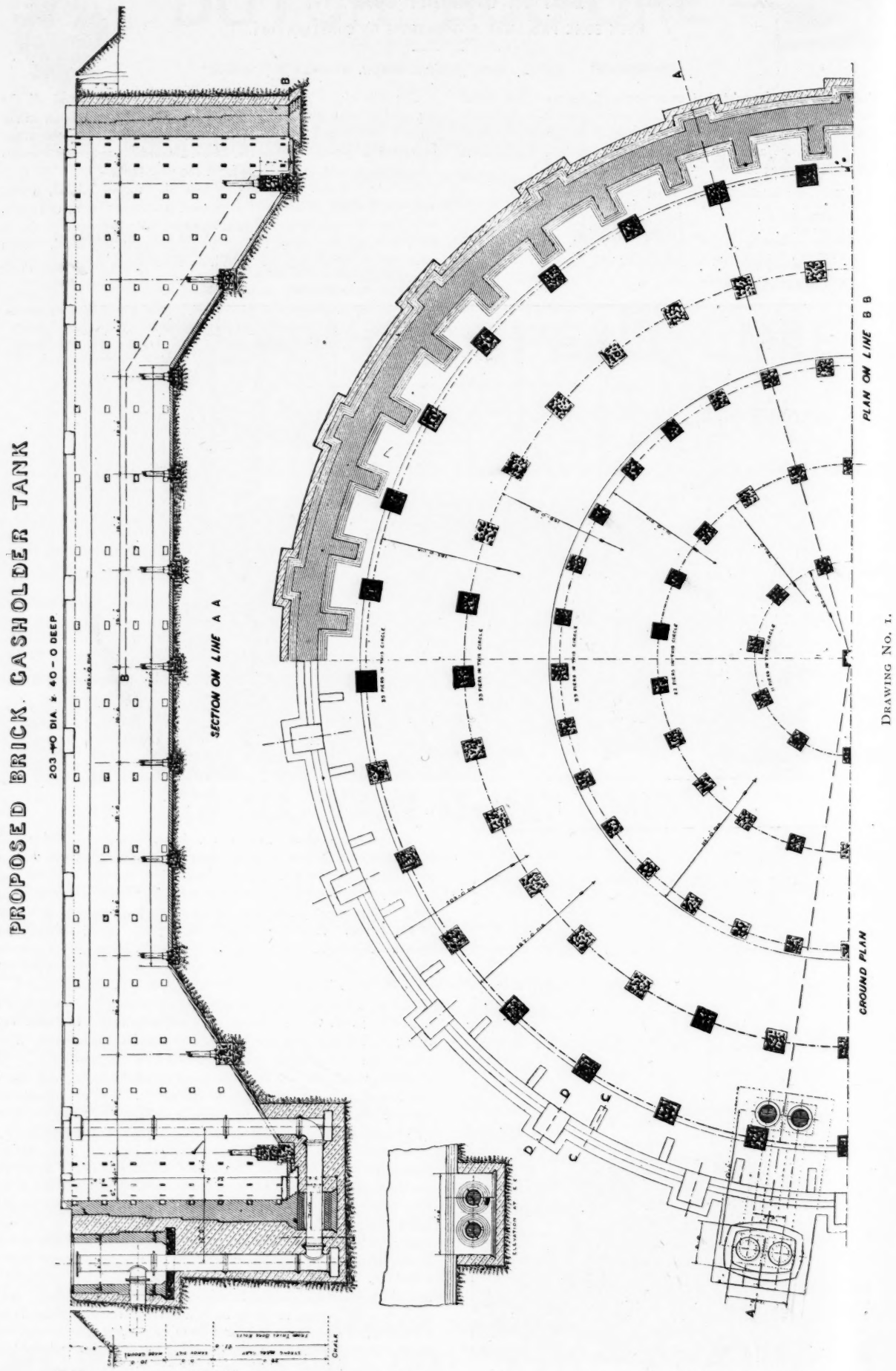
Holder Complete, with Gas in.

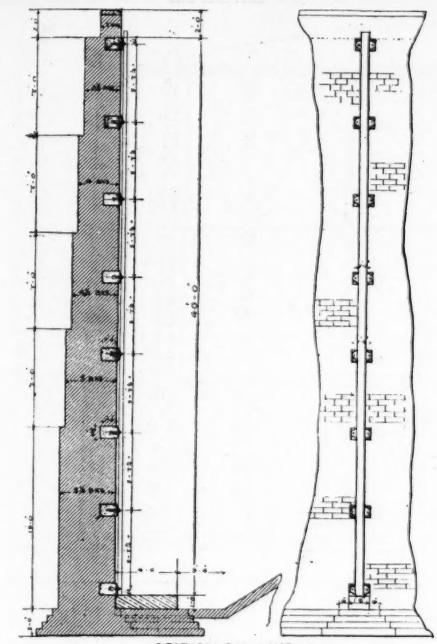


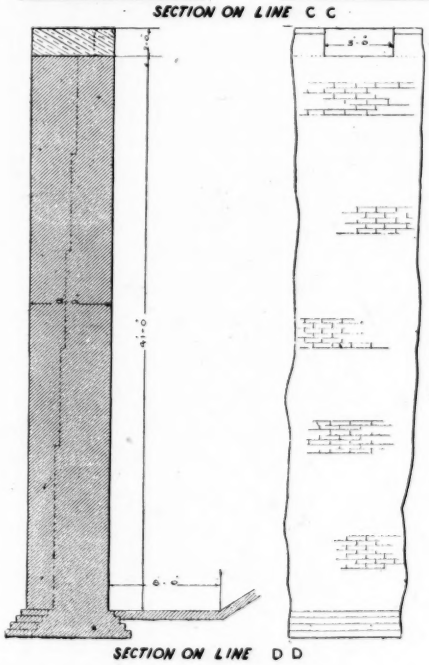
Guide-Framing, with Top Girder being Lifted.

On the north side there was a dyke, with rotten sides and bottom, which had to be kept uncomfortably near to; and here a retaining wall, 150 feet in length, was built, the top of which was level with the top of the tank. It was found necessary to drive piles 14 feet long by the bank of the dyke for this. At the back of these, was the concrete foundation, 3 feet thick, to carry the wall which was taken up with the tank wall. Some 4-inch drain pipes were built in the bottom of the wall; and it was backed up with broken bricks, clinkers, &c., to keep it dry.

Driving these piles, and making the concrete bed, was the first operation; and this was done while the position of the tank was being staked out and preparations made for excavating. The excavation of the trench was commenced on the north side, next the dyke; and the low side was filled up to the high level, when the trench was continued round the circle. The timbering was carried out in a very strong and efficient manner; and the only difficulty was in going through the silt—a quantity of straw having to be used at the back of the runners, to keep this from oozing through. The trench was kept lowest at the well-hole; and here the drainage water was pumped to the surface and carried away into the dyke. On reaching the hard clay, all trouble was thought to be over; but in reality it had only begun. Just when the last foot of excavation was reached, a large spring of lovely clear water broke out near one of the counter-forts; also a smaller one in the well-hole. It seemed a pity to think someone's water supply may have been shortened while, in this case, it had to be wasted. It is useless work trying to drive back a spring; the only thing is to control it. In our case, this was done by sinking a bell-mouthed pipe over the large spring, and pumping the water through the top by a "Pulsometer," which was kept going night and day, while


PROPOSED BRICK GASHOLDER TANK
203 FT DIA. × 40 - 0 DEEP
SECTION ON LINE A A
PLAN ON LINE B B
GROUND PLAN
DRAWING No. 1.



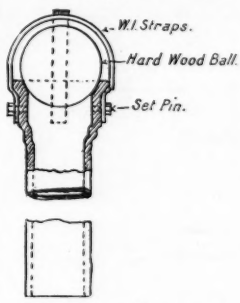


DRAWING NO. 1A.

the concrete with which the pipe was weighted down got thoroughly hard and set. The water was then allowed to run round a grip to the well-hole. The small spring was treated in a similar manner. An independent sumpt was then sunk clear of the tank, and a heading driven through to the well-hole. In this was laid a 10-inch cast-iron pipe; the heading then being well filled with puddle and stock rammed. The water was led through this to the sumpt, and pumped to the surface by a rocker-pump, kept going night and day till the gasholder was complete.

Now comes the extraordinary part of the story. After running at the same rate, so far as could be judged, for just over four months, the large spring suddenly stopped, as though it had been shut off with a valve, and gave no more trouble; and when the tank was going to be filled, the end of the pipe was plugged. Various opinions were given as to the cause. The writer's is that someone else, in sinking somewhere in the neighbourhood, must have come on the same spring and taken off the supply. But, whatever the reason, it was a great relief. The small spring at the well-hole, though it did not increase, nevertheless did not behave in such a considerate manner, but continued to run until the end. When the tank was ready for water, the end of the pipe in the floor was plugged; and a 1-inch vent-pipe was carried up the cone and one of the timber uprights above the water-level. The water in the tank was kept 4 feet above the level of that in the sumpt, till the natural level of the water in the ground was reached, when a diver went down and plugged the end of the 10-inch pipe in the sumpt. The tank was then filled, and proved to be quite tight.

With regard to dealing with springs in tanks, the writer has seen a very simple and effective way of doing this, as shown by the annexed sketch. An ordinary 3-inch or 4-inch socket-pipe (according to the flow of water) is sunk over the spring to the depth of 2 or 3 feet. The socket is turned true at the inside edge, and a turned hardwood ball is placed on this. The ball is kept in position by two straps put crosswise over the top, allowing enough "play" for the water to come through. If the head of water in the tank is greater than that of the spring, the ball rests on its seat, and prevents escape. The writer knows a tank with six such pipes in; and it is perfectly tight.



SKETCH OF PIPE USED OVER SPRINGS.

When the two springs described were under control, and the sumpt was working satisfactorily, the tank wall was commenced. This was of brick, with puddle backing. The clay at the bottom of the trench was worked up into puddle; and the footings were laid on this. These consisted of four double courses; and the wall started off these at five-and-a-half bricks wide, gradually diminishing to three bricks at the top, as shown on Drawings Nos. 1 and 1A.

The bond was alternate courses of headers and stretchers, and was carried up one frame of timber at a time. The puddle, which had been thoroughly worked in a pug-mill, was filled in at the back, and the runners drawn. The inside timbering was strutted off the wall in the usual manner. The clay for the puddle was picked from that dug out of the trench, and proved to work well. The tank guide-stones were built in as the work proceeded. They were left projecting $1\frac{3}{4}$ inches, and were dressed off afterwards to a plumb-line to 1 inch. The holding-down bolts for the standards were also built in at the proper level; and a space of 5 inches square was left round them for "play." This was filled up with cement grout when the guide-framing was complete. From the point where the tank wall came above the surrounding level, three strands of hoop iron, $1\frac{1}{2}$ inches wide of No. 8 gauge, were built in every second course. It was placed on edge, as being much better able to resist a bursting strain in this position than on the flat. The various lengths were lap-jointed—this method being preferable to riveting, as the strength in that case depends on the shearing of the rivets; whereas the surrounding brickwork keeping the laps from opening, the joint is as strong as the iron itself. Altogether $4\frac{1}{2}$ tons of hoop iron were used. When the wall had been carried up to its full height, and the embankment formed, the excavation inside was commenced and the cone formed, as shown on the drawing. The floor of the tank to the toe of the cone was covered with concrete 1 foot thick; and this, and the cone, were then paved with two courses of bricks—one on the flat, and one on edge. The concrete piers for the timber framing were formed as this was proceeded with; and when all was finished, it had a very good and sound appearance. The inlet and outlet pipes were fixed by the tank contractor as the work proceeded; and a shallow well was built on the outside, as shown. The writer is of opinion that a well-hole, where necessary at all, would be better carried down the full depth.

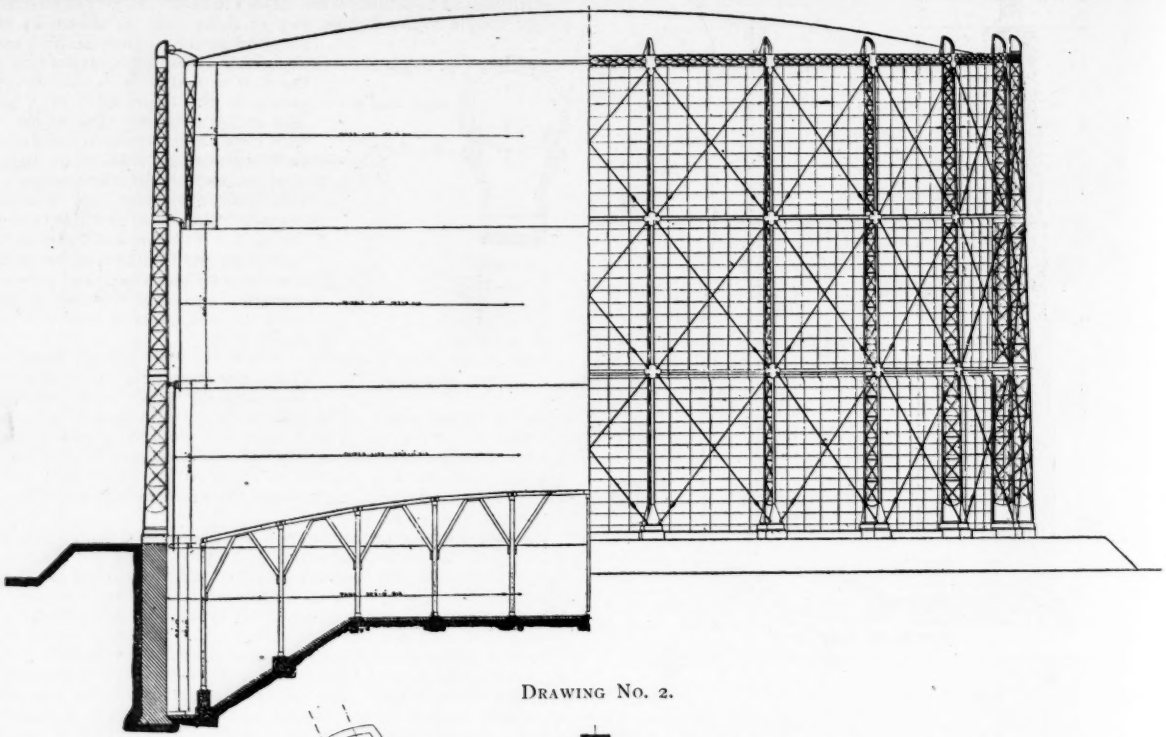
The following are the approximate quantities of material used, &c.:—

Excavation	35,800 cubic yards.
Bricks used	1,775,000
Cement	650 tons.

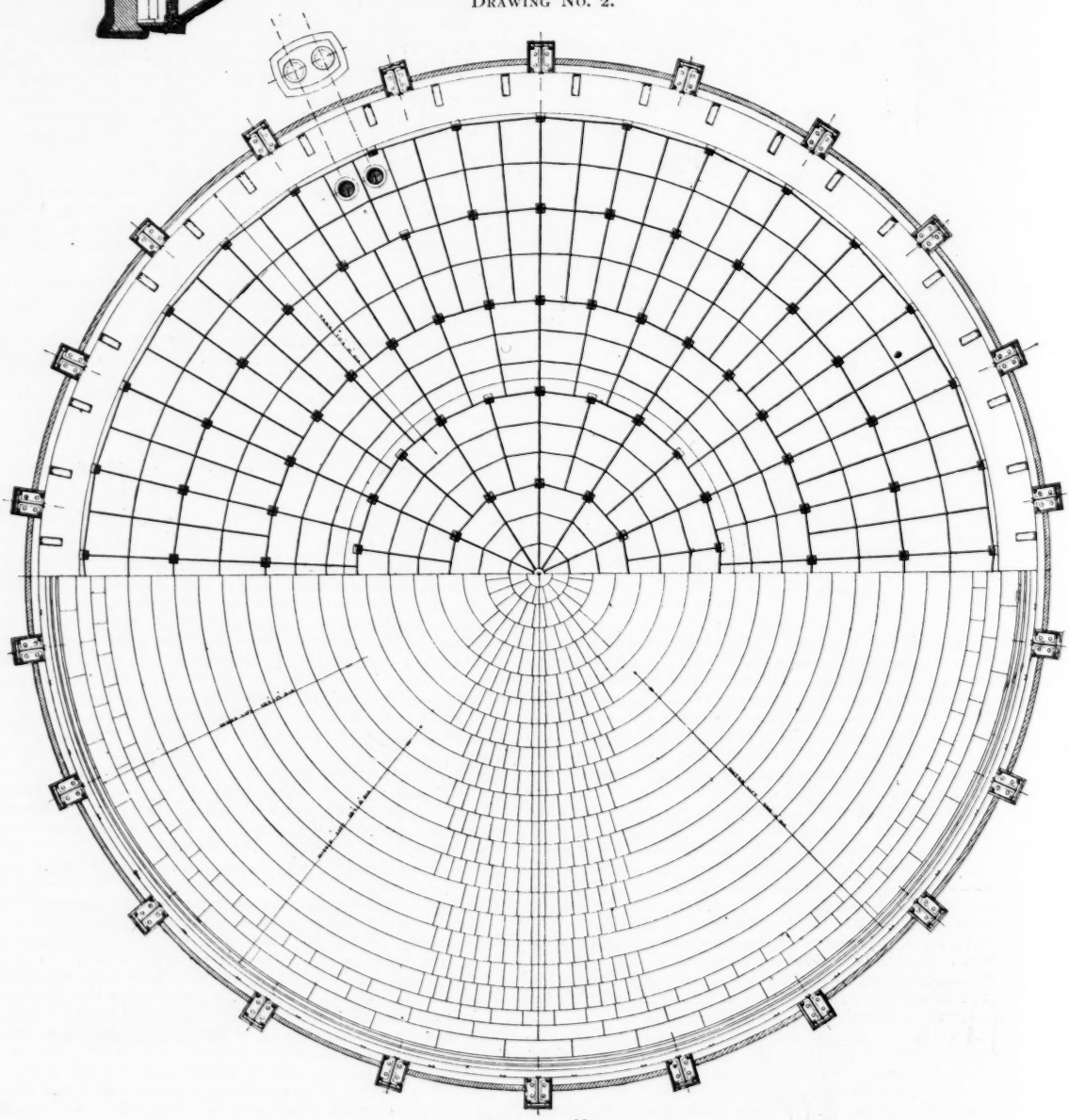
In designing gasholder tanks, the nature of the ground and local conditions, of course, have to be considered. But the writer thinks that concrete for this class of work is not as fully made use of by engineers as it might be. The Monier system of construction lends itself to so many different kinds of work—even to the building of arches for retort-settings—that it is a wonder it is not as much appreciated in this country as on the Continent. Where clay is available, as in this case, nothing can be better to make a tight tank; and it is far preferable to cement rendering. Care should be taken that the puddle is not carried up too high at one time; as, if so, it is liable to fall away and leave a space between it and the wall. It should also be well covered up and kept clear of brick-ends or any rubbish. The bricks should be kept well soaked in dry weather; but where each course is grouted in, if they are too wet, they are inclined to slide and get out of position. The cement should be tested in a machine for strength; and it should also be quite cool. A simple, but good, test for this is to mix up a small quantity neat, and time its "going off." If this takes from 15 to 20 minutes in warm weather, the cement is in good condition. The sand should be clean, sharp, river sand; and the writer has noticed that if there are traces of coal in small lumps in it, it always proves to be good.

The fender-wall round the tank was built when the holder was finished; and it was carried up level with the top of the column stones, and finished off with blue bull-nosed bricks. Two 4-inch over-flow pipes were built in at the level of the top of the tank—one at each end of the retaining wall—and carried into the dyke.

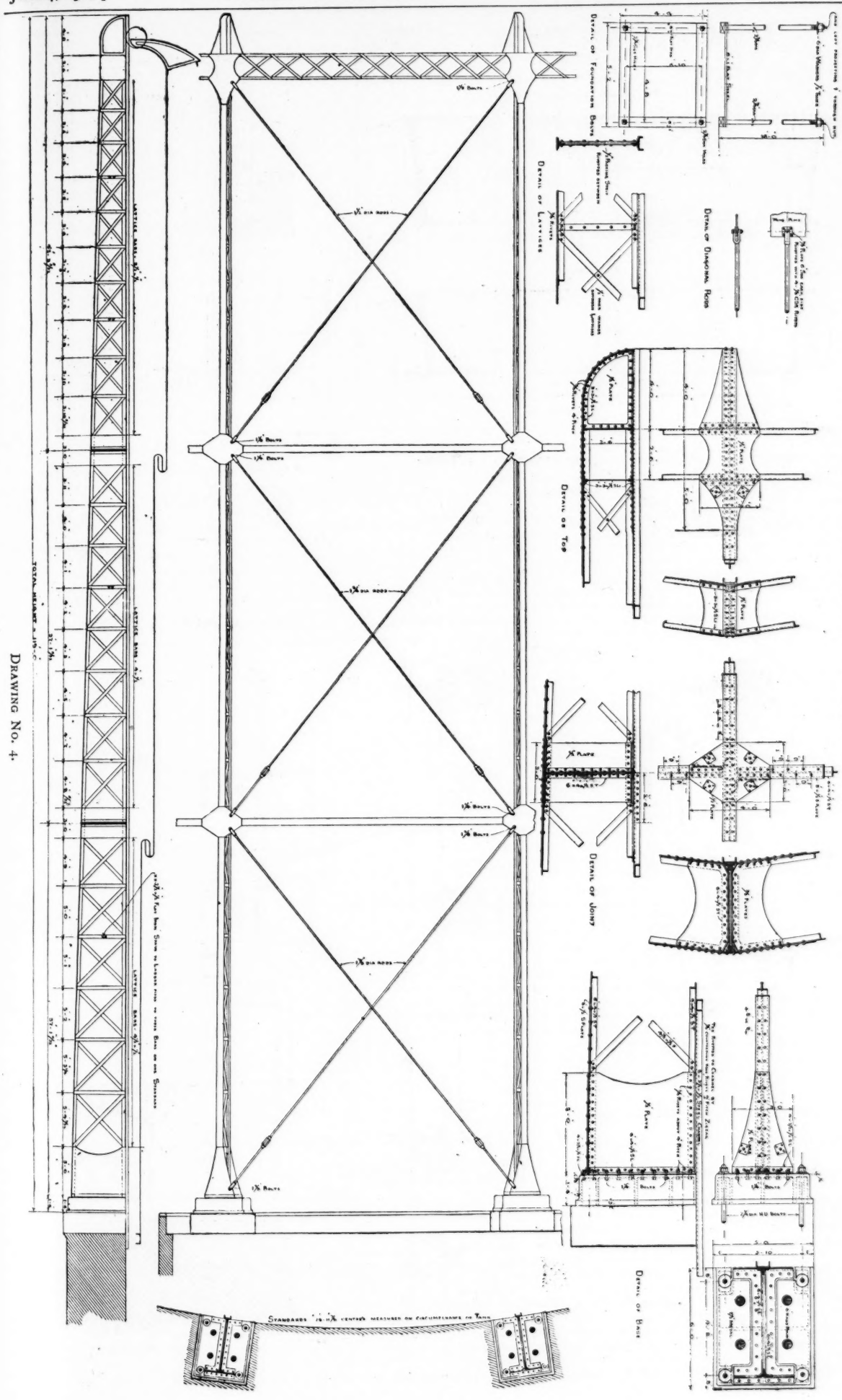
The contractors for the gasholder were on the works before the tank was actually finished, receiving material and also marking out the holes for tank guides, for which they were responsible; so that they were ready to commence on the holder without delay.



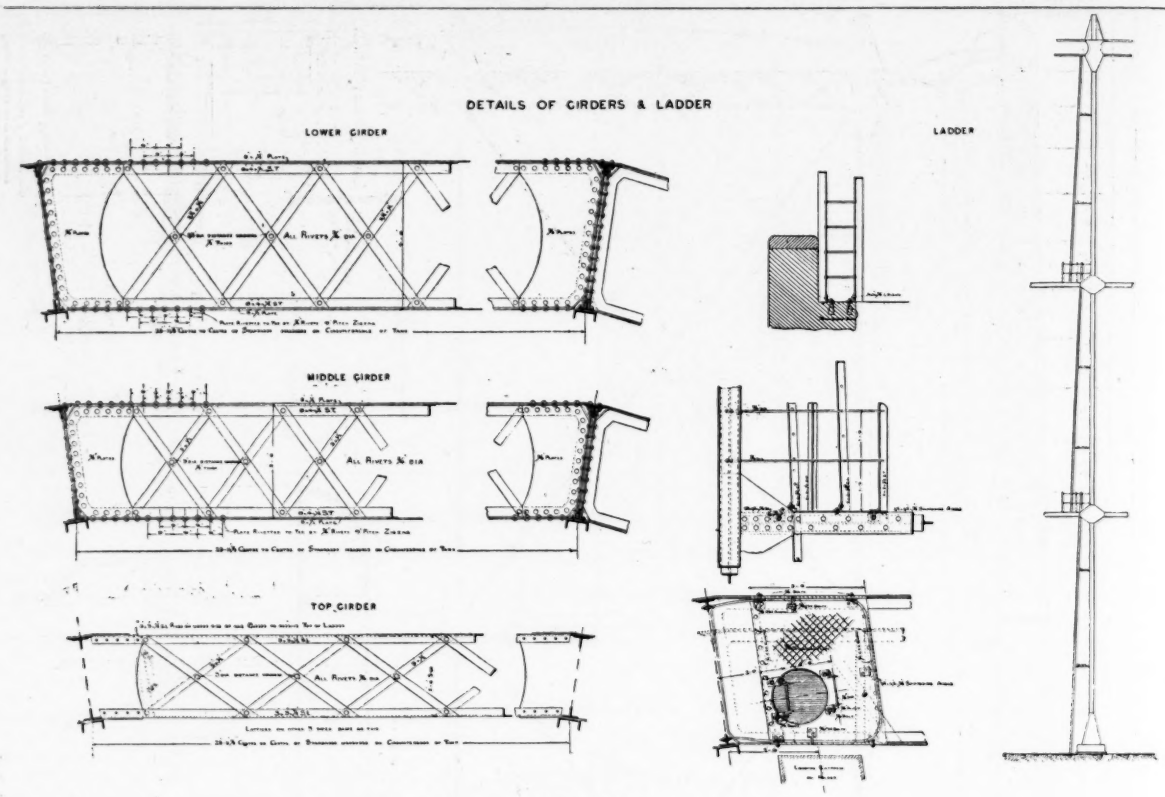
Drawing No. 2.



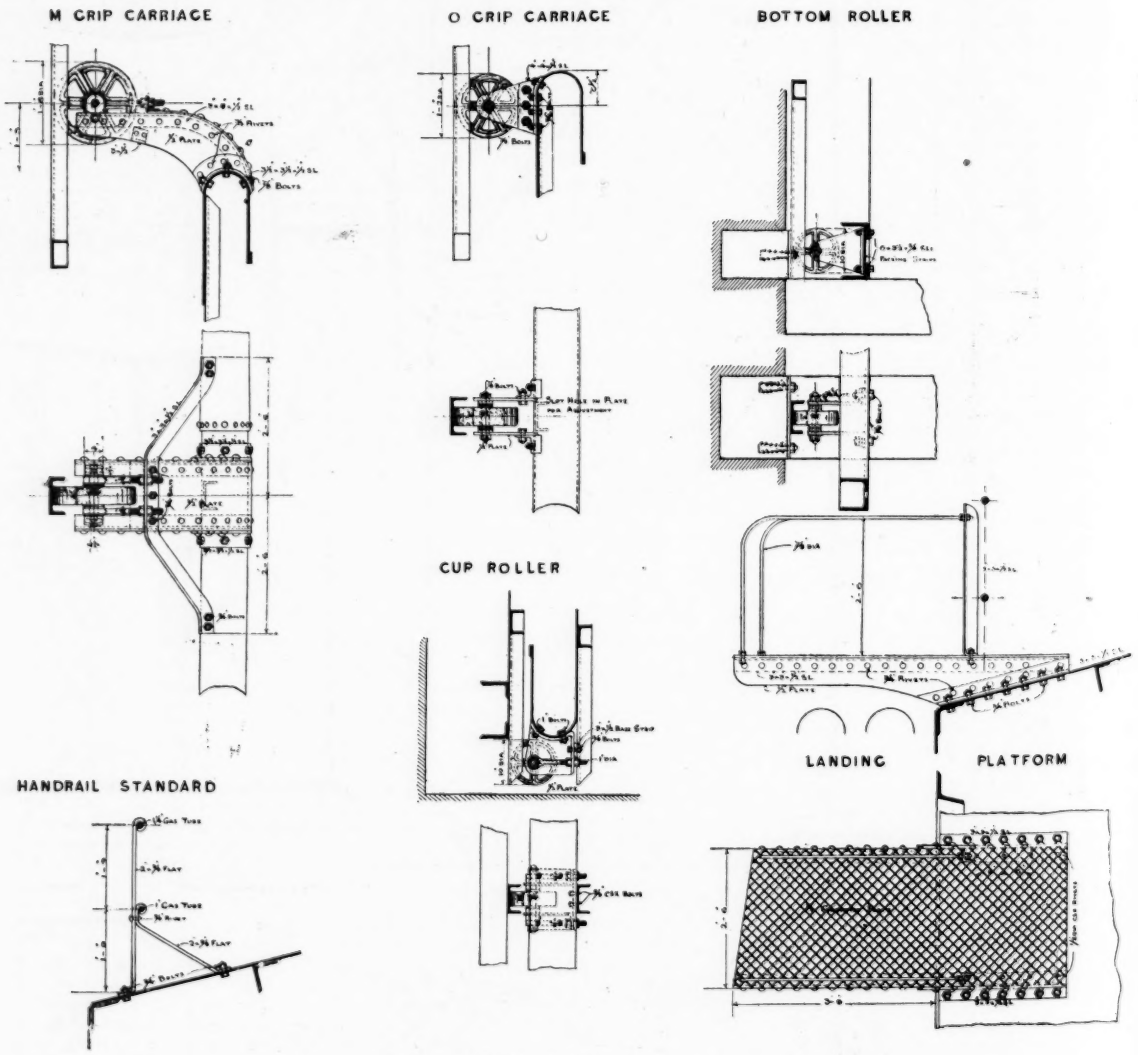
Drawing No. 3.


DETAILS OF STANDARDS
Detail of Foundation Bolts
Detail of Lattices
Detail of Diagonal Rods
Detail of Top
Detail of Joint
Detail of Base

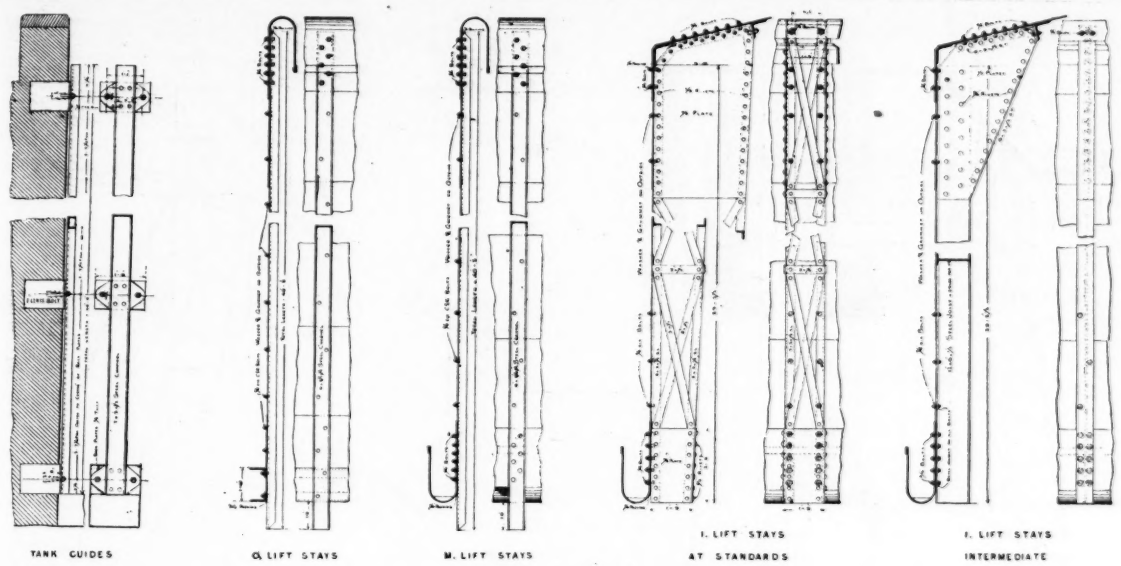
DRAWING No. 4.



DRAWING No. 5.



DRAWING No. 7.

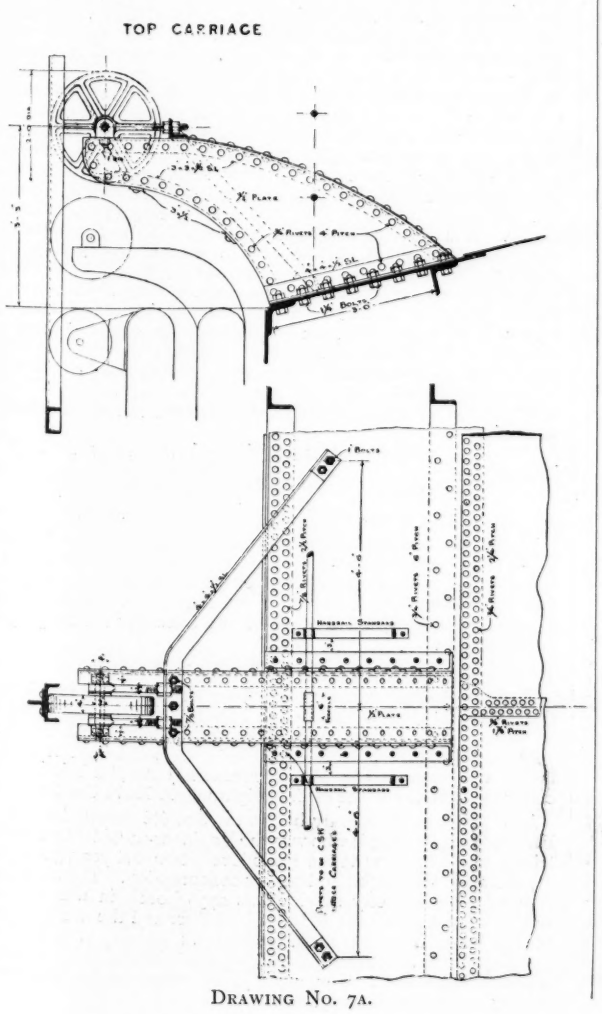


DRAWING No. 6.

They began first with the timber framing, and, as soon as the rest-stones were fixed and levelled, set out the bottom curb and commenced the lifts. The guide-framing was begun after the top curb was in position.

Drawings Nos. 2 and 3 show the plan and elevation and general design and dimensions of the gasholder.

Drawing No. 4 shows the details of the guide-framing, which was eventually altered by the addition of an extra tier of girders; these being also placed on edge, to correspond in design to an adjoining holder. The writer is of opinion that the original design, with a double set of tie-rods in each bay, instead of single, and the girders placed on the flat, would have been equally strong and rigid. With the exception mentioned, the work was carried out as Drawing No. 4. In designing a guide-framing, all complicated sections and forms should be carefully avoided, as well as any places where there is a possibility of moisture collecting. For this reason, a T section is preferable to two angles back to back, with lattice-bars between; and so many different sections are now rolled by makers, that it should not be difficult to find a suitable one for each part of the work. For the same reason, a nut with right-hand and left-hand thread is much better than a ring in the centre for tightening up the tie-rods, especially when there is an ornamental casting each side of the ring, as is so often the case. The writer has known instances where the bolt fixing these has corroded away, and they have had to be removed for safety, as the castings were continually dropping off. Also, if the nut is brought down near the girder, as in this case, they can be screwed up much tighter and better than if a man has to be swung in a seat to get at them. All the junction-plates at the joints, and base plates, should either be joggled to bring them close together, or the space should be filled with cement grout or borings; also to prevent the possibility of water collecting. The standards should be carefully examined as to their being plumb; as, if everything has been properly set out in the works, it is quite possible to have them within $\frac{1}{4}$ inch of being perfectly upright, and with the carriage-wheels carefully adjusted, the holder should work quite smoothly and regularly.



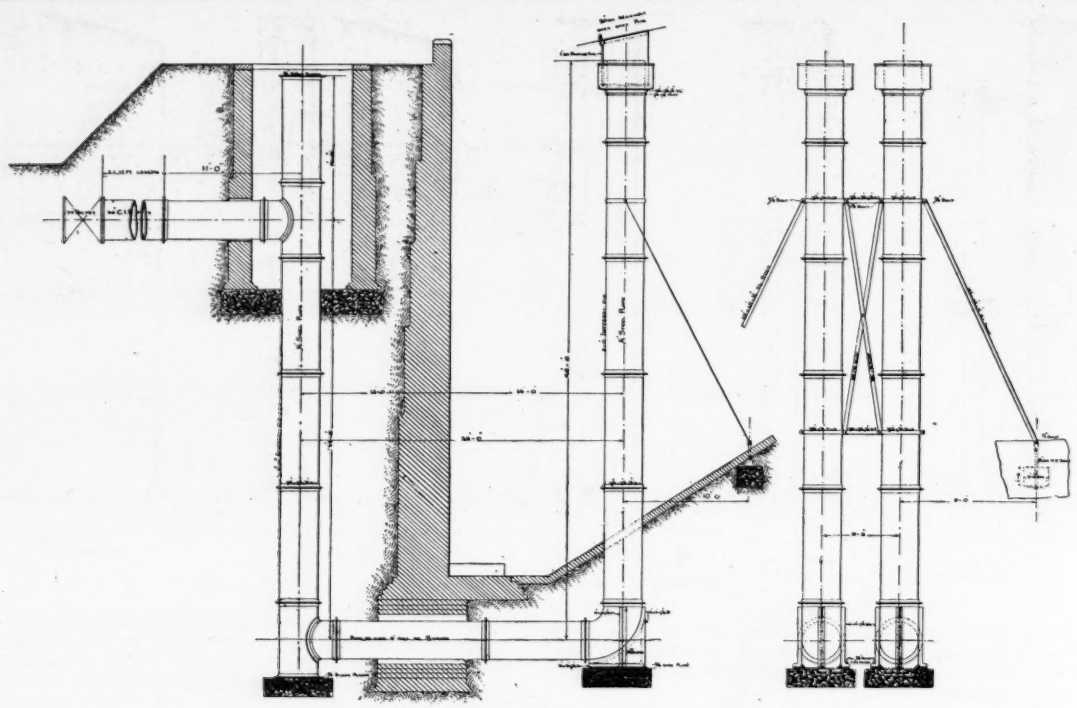
DRAWING No. 7A.

Drawing No. 5 shows the details of the girders and ladder as originally designed. The dimensions and general sizes were carried out; the exception being, as already stated, that they were fixed on edge instead of on the flat. The crown-sheets were fixed radially. They were No. 10 gauge in thickness, with $\frac{3}{8}$ inch centre plate, and two rows of strong plates, $\frac{1}{4}$ inch and $\frac{1}{2}$ inch respectively, joining on to the top curb. The rivets were $\frac{5}{16}$ inch diameter for the thin sheets, with larger sizes in strong plates, as shown. The radial form of crown is undoubtedly the strongest and best calculated to remain tight with the work put on it, as the strains are all down the line of rivets. A square-sheeted crown is probably cheaper, but is subject to cross strains in the seams, which are liable to cause leakage. With regard to the rise, the common practice is 1 in 20 of the diameter; but the writer prefers a greater one than this—especially in large holders—as the greater the rise, the more the strain is taken off the top curb.

The top curb was formed of a 6 in. by 6 in. by $\frac{3}{4}$ in. S.L., with $\frac{5}{8}$-inch curb-plate and $\frac{1}{2}$-inch hanging row, and a inner curb-bar also of 6 in. by 6 in. by $\frac{3}{4}$ in. S.L. It is very essential that the joints of the curb angle-bars should be iron and iron, to prevent any alteration in the formation of the curb when the weight of the other lifts comes on it. The sides of all the lifts were No. 11 gauge, with a row of stronger plates next the top curb and cup, and grips and cup.

Drawing No. 6 shows the stays for the different lifts; also the tank-guides. There were 44 tank-guides round the circumference of the tank; and they were fixed to stones about 5 ft. 7 in. centres, as shown. It is important that these should be fixed very firm and rigid; also perfectly plumb, so that the rollers may have a bearing on them the whole length. The stability and good working of a gasholder very largely depend on the tight and sound working of the bottom rollers; and, in the writer's opinion, too much attention cannot be paid to this point.

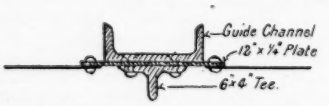
The inner lift stays were alternately a lattice-boom at the standards, and a 12 in. by 6 in. steel joist intermediate. The stays on the middle and outer lifts were stiffened by the addition of a 6 in. by 4 in. steel Γ and 12 in. by $\frac{1}{4}$ in. plate (see p. 1512). The disadvantage of these outside stays is the difficulty of making them gas-tight; and there was a good deal of trouble with them. The writer thinks that a section rolled with the guide-channel and plate in one, and a T bar riveted to this, as sketch, would



Drawing No. 8.

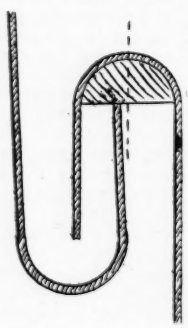
overcome the difficulty. But where there are many thicknesses, especially at the cup and grip, there is great danger of leakage.

With regard to the cup and grip, it is very essential that these should be of the same size, and set to a true circle. Supposing the grip is slightly larger than the cup, what happens is this: The cup, not engaging in the centre of the rest-block, tends to throw the grip over, and jam the carriage-wheels hard on the rails. The writer has seen this occur to a dangerous extent. The sketch (which is, of course, exaggerated) will show the working; and if



Method of Stiffening Sides.

Improved Method of Stiffening Sides.



Sketch Showing Effect of Cup being Smaller than Grip.

the grip is smaller, the reverse action takes place, throwing the wheels off the rail. The bottom curb should be made very stiff and rigid, to allow the rollers to be put well up to their work without springing. As has been said before, the successful working of the holder and its stability largely depend on this.

Drawings Nos. 7 and 7A show the various carriages and rollers. It will be noticed that in the top and grip carriages there is adjustment of the wheels on the rail; and also the side-blocks allow of their being plumbed. Holders often slew round in working up the guide. The cause of this is that some of the wheels, not being plumb, act like a "cutting" roller, and cause the lift to work round. If the wheels are carefully watched, and set true, this can be entirely obviated. The outer-lift wheels, not working so far up the guide, have not the same effect, and need not be troubled about so much. The cheeks of the cup-rollers were stamped out of a solid steel plate, and securely fixed (as shown); so that the only cast metal in the whole work was the wheels. These were of cast steel. Those on the carriages were provided with lubricators, to obviate the necessity of oiling so often. A gasholder, when once put in action, with the exception of periodical painting, is often left to work its own sweet will; and when the wheels begin to "jump" and make a noise, one only grumbles and passes on. The writer is of opinion that a holder that is working up and down much, as most of them are, should have the wheels overhauled and oiled at least once in six months.

Drawing No. 8 shows the inlet and outlet pipes. These were 36 inches in diameter, made of ⅜-inch steel plate, with angle steel joints and braced, as shown. They were provided with seal-cups inside, to shut the holder off if necessary.

Drawing No. 9 shows the form of timber-framing used to support the crown. The uprights on the top of the cone were 9 in. by 9 in., and those on the slope 12 in. by 12 in., fitted with cast-iron bases and caps, to receive the top timbers. The main rafters and cross timbers were 11 in. by 3 in., and the intermediate purlins were 11 in. by 2 in. The circles of uprights Nos. 2 and 5 were braced with ⅞-inch diameter rods, as shown. In designing a timber-frame, it should be borne in mind that it not only has to carry the weight of the crown-sheets, but also the scaffolding and men during erection, and is often put to severe and unequal strains. The writer has known instances where the timbers have had to be strengthened to do this; and he also knows a case where the uprights were made 14 in. by 14 in. and the rafters 14 in. by 6 in., which is, of course, unnecessarily strong. It is also important to keep the openings between the top timbers as small as possible, to prevent the sheets from sagging. This not only makes the work come together badly, and is the cause of much rhymering of holes, but it makes hollow places in the crown where water accumulates when the holder is at rest. The timbers should be arranged to miss the riveting of the sheets, as this can be made a much better job of when clear of all obstacles. Photographs taken during the course of erection showed that the crown-sheets laid very evenly and well; and when finished they looked almost as though the holder was inflated.

The total quantity of material used was approximately as follows:—

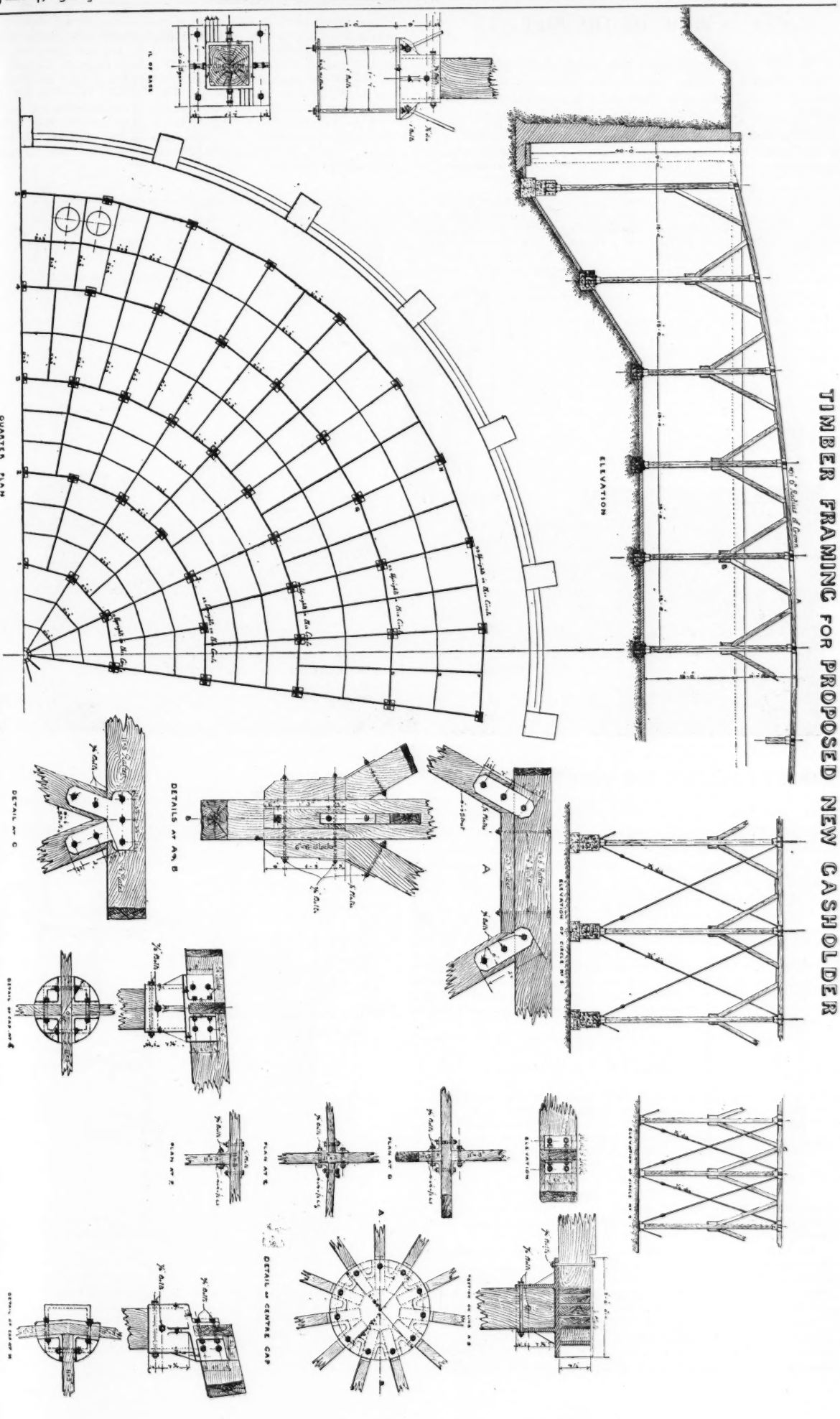
Guide-framing	335 tons.
Holder	367 ,,

It only remains to add that the holder has now been in action some time, and works quite smoothly and satisfactorily. The writer is indebted to the kindness of Mr. A. Dougall, the Engineer and Superintendent of the Hull Station of the British Gaslight Company, Limited, for the use of the drawings for the purpose of this article.

As has been already announced in our pages, the members of the Société Technique du Gaz en France will, after their congress at Dieppe, cross over to Newhaven, and go thence to Brighton on July 22, to visit the gas-works, where they will be entertained at lunch, and welcomed by Mr. R. Hesketh Jones, on behalf of his colleagues, the Directors of the Brighton and Hove Gas Company.

In a paper read recently before the Société Internationale des Electriciens, M. Picou, who was the Engineer-in-Chief for the electricity supply service at the Paris Exhibition last year, gave some figures as to the output and power consumption. The total duration of the electricity service was 2756 hours, in which period public lighting was supplied for 909 hours, and the average number of hours' running of the generators was 713·5. The total connections to the mains represented 11,265 kilowatts—practically 20,000-horse power. The mean daily output of the generators was 25,336 kilowatt-hours.

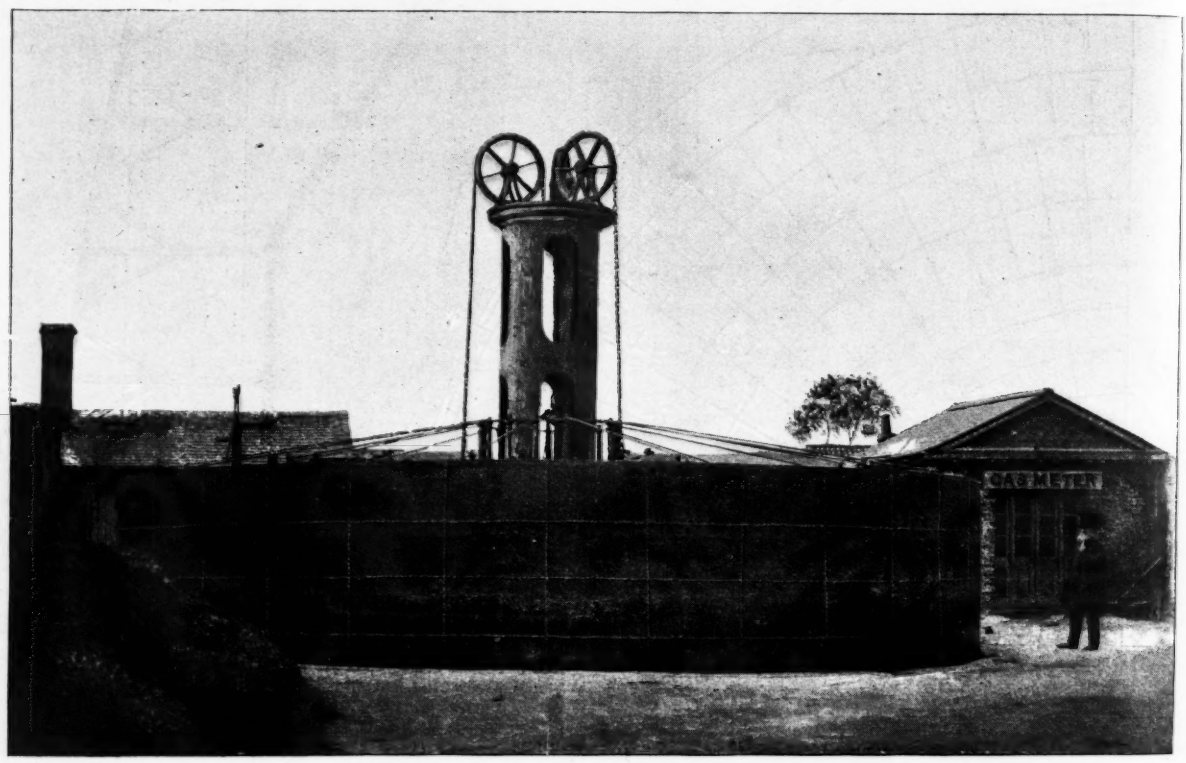
TIMBER FRAMING FOR PROPOSED NEW GASHOLDER



DRAWING No. 9.

A RELIC OF THE PAST.

It is difficult for the younger generation of gas engineers, who are accustomed to seeing gasholders of gigantic size, and to witnessing the innovations in their construction—the light framing and the spiral and wire-rope systems of guiding—which constitute a marked feature in modern gas engineering, to realize what some of the vessels were like which were used for the storage of gas in past times. We are pleased, therefore, to be in a position to enable them to do so by means of the accompanying illustration, which has been produced from a photograph courteously placed at our disposal by Mr. Leonard G. Hall, Assoc.M.Inst.C.E., Gas and Water Engineer to the Rhyl Urban District Council. It shows an old central-column gasholder which was originally in use at the Boston (Lincolnshire) Gas-Works. It will be seen that there was no external guide-framing. The column was hollow, with the counterbalance weights inside; and the curb was stiffened with outside tie-rods. In other respects the picture speaks for itself. The figure seen on the right is that of Mr. Stout, the former Manager at Boston.



BONNET'S SYSTEM FOR GUIDING GASHOLDERS.

The specification has just been issued of a patent applied for last year by M. Jean Edouard Bonnet, of Lyons, for "a new system and means for guiding gasholders," in the course of which he says: "To replace the stone pillars, the cast or wrought iron columns, several means have been used, among others guiding by a spiral and by cables with numerous pulleys. These complicated arrangements, of doubtful security and almost impossible of examination, have not given the expected results. To remedy these defects, I have contrived a new system of guiding by pulleys which is very simple, of absolute security, easy of examination and of maintenance—all the moving parts being on the outside and accessible."

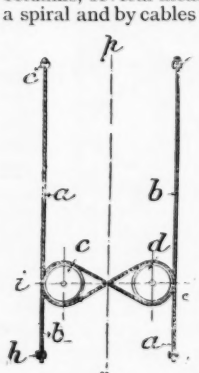


Fig. 1.

The invention is based on the property possessed by the system of cables and pulleys represented diagrammatically by fig. 1. If two cables a and b stretched part of their length parallel to the axis o, p, and crossed on the pulleys c and d, have their extremities fixed respectively in e, f and g, h, and if the two pulleys c, d, mounted on the same structure, move along the length of the cables which surround them partially, the axis i, j joining their centres will remain parallel to its original position during its movement, and will be in consequence always perpendicular to the axis o, p. This the patentee terms the first principle.

Similarly, if retaining the same arrangement, the structure carrying the pulleys c and d is made stationary, and if the points e, f, g, h are fixed on a moveable frame, this frame will be able to slide parallel to itself, and the cables a and b will remain perpendicular to the axis i, j. This he terms the second principle.

Applying the first principle to the guiding of the bell of a single-lift gasholder, the arrangement will be as indicated in fig. 2. The connecting points e, f, g, h of the cables a and b will be fastened to the walls of the tank; and the pulleys c and d will be fixed to the lower part of the bell. Light iron rods k and l fixed to the tank against which the pulleys c and d touch and roll, prevent the rotation of the bell on its axis. The number of cable systems being proportionate to the size of the gasholder, according to the first principle, the bell will "rise and fall truly vertical, without being affected by wind pressure."

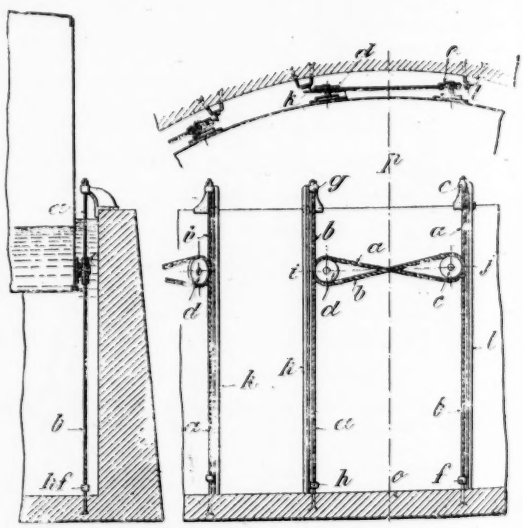


Fig. 2.

If the second principle (fig. 3) is applied, the cables a and b are fixed vertically at the points e, f, g, h; and, on the outside of the bell, the pulleys c and d are fastened to the internal periphery of the tank. The light iron uprights k and l riveted to the bell, and which run along the length of the cables, prevent (as shown in fig. 2) the rotation of the bell; so that, whatever be the

external influences, the true up-and-down movement of the bell, and the perpendicularity of the holder, will be assured.

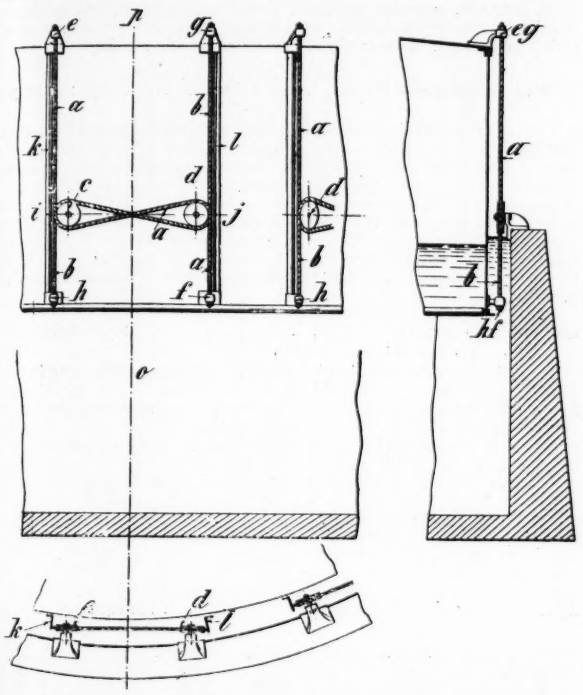


FIG. 3.

These principles applied to telescopic holders will give the arrangement shown in fig. 4. For the bottom lift, the guiding will be the same as in the case of single-lift holders. For the upper lift, the cables and guiding-posts will also be arranged in the same

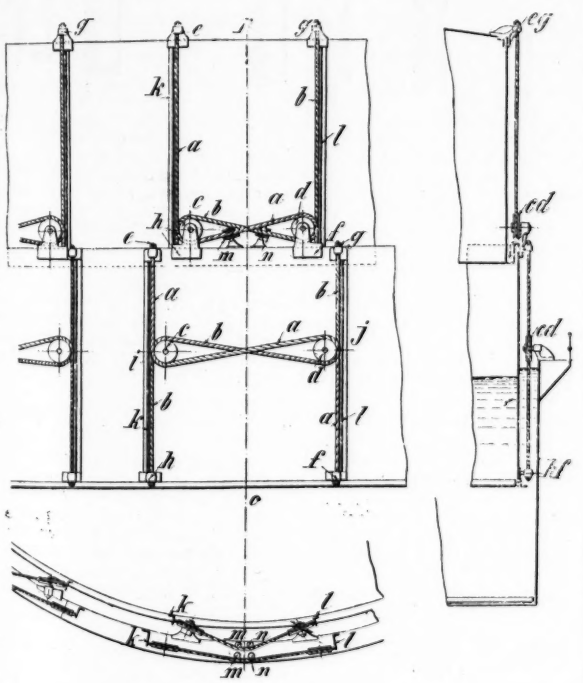


FIG. 4.

fashion, but the pulley will be fixed to the top of the lower lift, as shown. In short, the pulleys employed for guiding the upper lift will be fixed to the lower lift, and those used for the lower lift will be fixed to the tank. The required direction can be given to the cables *a* and *b* by means of the rollers *m* and *n*.

In this way, the inventor claims to be able to "replace the old complicated and costly systems of guiding gasholders by a very simple system, presenting every security, easily examined, and of which all the moving parts are always accessible." It is also possible to "realize a very notable economy; and for the telescoping of existing gasholders it is especially applicable, since it will render useless the erection of columns."

REGISTER OF PATENTS.

Liquid Meters and Control Valves Therefor.—Kent, W. G., and Gordon, J., of High Holborn, W.C. No. 6137; April 2, 1900.

This invention relates to any form of pressure indicating or recording device, in which a variable pressure is utilized to indicate the speed or quantity of a stream of liquid passing through a restricted orifice; and it consists of "an automatic valve adapted to control and modify the effect upon the gauge of the indications or records by pressure, of the velocity or quantity of such passing stream of liquid."

The arrangement suggested consists of a valve placed in an orifice of issue of a passing stream of liquid—whether such orifice be (1) in the direct delivery-pipe of a pump or equivalent, (2) in the exit-orifice for the liquid, out of an intermediate closed air-chamber, or (3) in a bye-pass pipe connecting two other pipes conveying a difference of pressure to a recorder from a steam-gauge apparatus—such as a Venturi tube. The valve is so adapted that it normally closes the orifice, and will not permit it to be opened until a predetermined pressure has been developed in the liquid—permitting a normal, or an especially quick and immediate, rise of pressure in the liquid, or in a confined air volume in contact therewith, for transmission to the indicating or recording gauge until the orifice commences to open.

To effect this, the valve is so controlled by a spring, a counter-weight, or its own elasticity, that normally it closes the orifice to which it is adapted, up to a predetermined pressure; and upon receiving an increase of pressure, it opens the orifice of issue. The orifice or passage in which the valve is placed may also be so formed and situated relatively to the valve, that, after the first opening of the orifice, an accumulation of further pressure upon it will cause the valve to further increase the area of the orifice of issue, and thus serve to reduce any eventual pressures, due to the greater velocity or quantity of liquid that is permitted to pass the controlled orifice in a given time.

Such a valve, with its elastic or reaction control, may take many styles, with equivalent function and effect; but as examples of practical forms, the patentees describe a piston-valve controlled by a spring reacting against the liquid pressure at its end—the valve sliding over and closing normally a lateral orifice of issue in the casing in which the piston slides. The retirement of the piston-valve under pressure will, at a predetermined point of pressure, open the orifice, and thereafter enlarge the effective area of the orifice, by further movement against its reacting spring, as the accumulated pressure upon its end increases. An arrangement that may be used (equivalent in its action, and with probably less frictional resistance) consists of a spring-pressed disc-valve closing upon a sharp seat and rising from its seat in a conical chamber, so as to give a variable and increasing aperture about the valve as it rises.

Furnaces and Means for the Recovery of Bye-Products from the Fuel used Therein.—Naef, P., of New York. No. 6563; April 7, 1900.

This invention refers to a method of recovering bye-products—such as tar oils and ammonia—from furnaces in which bituminous fuel is burned; the objects aimed at being: To burn bituminous fuel without producing smoke; to utilize the volatile matter of the coal; to obtain all the bye-products contained, in a small volume of gas, so as to require small recovery plants; and to reduce labour.

The invention consists in first subjecting the fuel to dry distillation by conducting hot gas through it, and passing the gas thus obtained separately through an absorbing plant, and afterwards burning the remainder with air. The distillation is effected by drawing some of the gases of combustion through fresh fuel.

This can be carried into effect in several ways; but the apparatus preferred has the shape of a shaft preferably covered with iron to avoid leakage. It has an arrangement for charging fuel into the top, and a gas-outlet near the top leading to washing plant to recover tar and ammonia. At the bottom, it has an inclined grate or other means for supporting the fuel, and an arrangement for introducing air (at low pressure) under same. Some distance above the inclined grate communication is effected with the furnace to be heated.

The suggested operation is as follows: Air is blown under the grate, and burns the fuel in the lower part chiefly to carbonic acid. Most of the hot fire-gases enter the furnace for the purpose of heating it; but some of the hot gases are drawn upwards through the fresh fuel, where they cause dry distillation of the volatile matter, with the production of gas containing tar oils and ammonia, which is withdrawn near the top and conducted through washing plant by means of a fan.

For the purpose of increasing the production of ammonia and oil, water is, with advantage, introduced in the liquid or gaseous state into the column of fuel where distillation takes place. To reduce the back-pressure, and facilitate the passage of the gas through the fine fuel, perforated surfaces are arranged; and moveable bars can also with advantage be used if the combustion takes place at the base of the column itself. It is then advantageous to spray some water on the bars to prevent clinkering, so that the cinders can pass through the spaces between the bars. The method can also be carried out in such a way that air is drawn or injected into a body of fuel some distance from the bottom. Most of the combustion gas is drawn into the furnace, and so much is drawn upwards as is required to effect distillation; the gas being conducted to suitable washing plant.

Producing an Inflammable Mixture adapted for Incandescent Lighting.—Legge, J. St. C., of Drumcondra, near Dublin. No. 8635; May 10, 1900.

This invention relates to the production of an inflammable mixture of air and gas or vapour which has a high flash-point, and which will not ignite except when burnt under pressure. It is thus said to be adapted for being burnt in conjunction with incandescent mantles.

To carry out the invention, a current of air is passed under pressure through a pipe opening in a vessel or reservoir containing a mixture of benzoline or gasoline or other light hydrocarbon and spirits of camphor, in the proportions of about ½ oz. by weight of camphor to 1 gallon of hydrocarbon. In this mixture, from 4 to 6 oz. by weight of naphthalene

is immersed. But, instead of immersing the naphthalene in the mixture, it may be placed on perforated or other trays, in which case the air under pressure is passed first through the vessel containing the mixture, and then through or over the trays holding the naphthalene. Any suitable means may be used for automatically feeding the liquid to the reservoir, for causing the compressed air to spray or atomize the liquid, and for diluting and carrying off the mixture of air and gas or vapour. These are not part of the present invention.

Automatic Gas Lighters.—Justice, P. M.; a communication from C. W. Bernson, of New York. No. 8720; May 11, 1900.

These automatic gas lighters consist of an igniting body having the property of occluding gas and generating heat, for first igniting a small jet issuing from a bye-pass of the gas-cock before opening the main passage; and this ignites the main gas-jet when the cock is further opened, and is cut off when the main passage is sufficiently opened for use.

Fig. 1 shows a gas-cock provided with the igniting device applied to an ordinary burner. Fig. 2 is a modified form of construction applied to an incandescent burner.

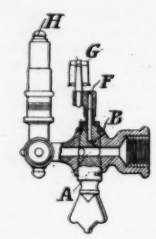


Fig. 1.

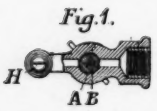
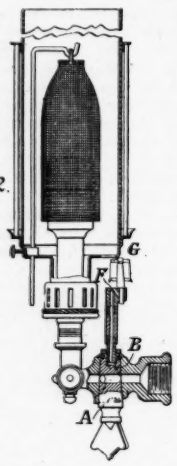


Fig. 2.



The essential feature of the invention is in the construction of the plug A of the gas-cock E with the bye-pass B for the igniting-gas formed in it, and leading directly into a socket or centre-bore of the upper end of the plug for attachment of the igniting-burner directly to the end of the plug—thus "making a simpler construction and a better appearance, and at the same time permitting the usual adjusting nut for the plug to be used." To this end, there is provided the small passage B from the exterior surface of the plug a little in advance of the opening-end of the main passage into a centre bore of one end of the plug, from which there is communication with the igniting burner-tip F with which the igniting-body G is mounted in such relation to it and the main burner-tip H (fig. 1) or the incandescent burner I (fig. 2), that when the cock is partly opened (as represented) the igniting-gas escapes through the bye-pass to be ignited by the body G. The main jet will then be ignited by the igniting-jet when the cock is further opened, and the igniting-jet be cut off.

In fig. 1, the plug A is constructed with an integral tubular extension for the connection of the burner F; and the nut for tightening the plug is perforated, and screws on to the extension in lieu of the usual tap-screw screwing into a socket of the plug. In fig. 2 the extension-piece is formed separately from the plug, and is screwed into a tapped hole in the end of the plug; the nut being similarly perforated and screwed on to the extension-piece.

Media for Incandescent Lighting.—Nielsen, R. A., of Copenhagen. No. 9785; May 28, 1900.

The specification of the inventor's previous patent (No. 2672 of 1900) described a method of manufacturing incandescing media, according to which the oxides used are drawn out into threads with the aid of the electric arc, and these threads are made into incandescing media for incandescence lighting. But in carrying out the method described, difficulties were sometimes encountered, which are consequent upon the direct application of the electric arc—the immediate formation of metallic carbides at the very high temperature of the electric arc, by reason of the carbon vapour present (these conditions being most favourable for the formation of such carbides). Further, all the metallic oxides used become conductors of the second class as soon as heated to a red heat—*i.e.*, the passage of the electric current involves their decomposition. If the threads were made without consideration of these matters, they would be very impure by reason of the presence of carbides, and also of the products of the decomposition of the metallic oxides. However, as the carbides are immediately decomposed under the action of water vapour, and as the electrolytic products of decomposition of the metallic oxides undergo a thorough change under the action of oxygen and water vapour, which are always present in the non-luminous bunsen flame used for incandescent gas lighting, the durability and life of incandescing bodies so made will consequently be comparatively short.

The patentee proposes to overcome these difficulties by applying only the heating effect of the electric arc, excluding the electrolytically decomposing action of the same, and avoiding the carbon vapours which are simultaneously evolved. This is effected by placing the substances under treatment in crucibles or the like, and introducing them therein into the electric furnace. From the molten mass thus obtained, the threads which are to be made into incandescing media as before described are produced by any suitable mechanical means.

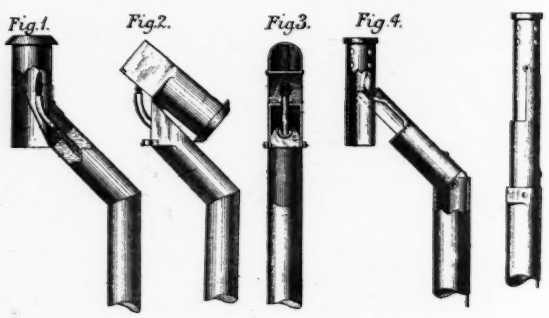
The patentee claims to have further discovered that the applicability of his invention is not limited to the oxides of the rare earths or of the alkaline earth-metals, or of the elements, zirconium, thorium, molybdenum, tungsten, uranium, titanium, vanadium, niobium, and tatalum; but that it may be applied in the case of all other earths and substances which are used in the manufacture of incandescing media.

Guiding Gasholders.—Bonnet, J. E., of Lyons. No. 11,858; June 30, 1900.

The patentee describes an arrangement for guiding gasholders, consisting of cables stretched in pairs parallel to each other vertically for a part of their length, and crossed transversely on two pulleys mounted on the same structure; the pulleys being able to travel along the length of the cable, while the extremities of the cables are fixed to the tank or to the gasholder, and the structure carrying the pulleys being then integral with the gasholder or with the tank—the number of guides for each holder depending upon the circumference of the latter. [An illustrated description of the arrangement appears in "Technical Record," p. 1514, to-day.]

Gas-Lighting Torches.—Glover, J. G., of St. John Street, Clerkenwell, E.C. No. 12,239; July 6, 1900.

The object of this invention is to construct a torch for lighting incandescent street-lamps, so that the flame can be held over the chimney for igniting the uprising gas without it being necessary to tilt the torch-stick at an angle (as with the ordinary construction of torch), thereby avoiding injury to, or breakage of, the lamp. For this purpose, the oil-reservoir and burner are placed at an angle to the torch-stick; and pivoted or hinged to the reservoir, or an extension of it, is a tube which in the normal condition is in a parallel position to the torch-stick, but at a distance from it. This tube contains the burner, and is also provided with a partition (or the partition may be from the tube itself) the upper part of which terminates at about the burner, so that the uprising gas from the lamp to be lighted will pass up the partitioned part and out at the top, where it will become ignited by the burner and light the lamp—the partition or angled portion of the tube preventing



the burner-flame being blown out by the ignition of the uprising gas. The tube is temporarily held in position by clips or wings; and the oil-chamber is pivoted to the stick, so that it can be operated for placing it to an angled position by rods and levers or other devices by the lamp-lighter—the reservoir-tube and other appurtenances in this case being in line with the torch-stick when not in use.

Fig. 1 is a part sectional side elevation of a torch-head in which the flame-tube is hinged to the burner-casing. Fig. 2 is a side elevation of the torch-head, with the flame-tube thrown back—the burner-tube being exposed ready for lighting. Fig. 3 is a front elevation of fig. 2. Fig. 4 is a part sectional side elevation of a torch-head in which the flame-tube and burner are operated by a knob or ring situate about the other end of the torch-stick, the flame-tube and burner being in position for gas lighting; also an elevation of the torch-head, the parts being in the position they occupy when the torch is being carried.

Gas-Meter Indices.—Roberts, J., of Llanfairfechan, North Wales. No. 4121; Feb. 26, 1901.

This invention has for its object to provide means for enabling consumers to see at a glance the number of feet of gas which have been consumed, together with the cost, by furnishing the meter-casing with slots in its face for the display of suitable numerals; and fitting rollers rotatably mounted in the casing, having displayed numerals on them representing cubic feet of gas, pounds, shillings, and pence, arranged in vertical columns, and adapted to be shown through the slots. There are projecting handles on the rollers, for the purpose of rotating the latter independently.

Means for Lighting Gas.—Borchardt, H., of Berlin. No. 4395; March 1, 1901.

This igniting-device applicable to gas-burners is operated electrically; the burners for which it is intended being those which comprise an additional tube for an accessory or pilot jet and a valve arrangement, whereby a passage for the gas, leading to the pilot-tube, may be opened for the purpose of igniting the pilot-flame. The features peculiar to the device are, firstly, that an igniting (platinum) wire, without being connected to a platinum sponge (in accordance with the usual practice), undergoes preparatory heating under the action of an electric current conducted through it. This initiates the heating effect, which is gradually intensified by the gas-current itself, until the igniting temperature is attained. Then, by electro-magnetic operation, the valve arrangement is so controlled as to open the passage which leads to the point where ignition is to take place.

The object of the entire arrangement (which, in its essence, is not unlike an electric light switch) is in all cases to induce an igniting effect unaccompanied by an explosive shock, so that the mantle shall not be subject to concussion. In addition to this, in the arrangement shown,

the moment at which the pilot-jet transfers its flame to the main burner and itself becomes extinguished, is made to coincide with the moment when the circuit-closing device or contact-piece is released. The greater or less interval, therefore, which, in automatic igniters or fuses, elapses before the full igniting effect is attained, is here avoided.

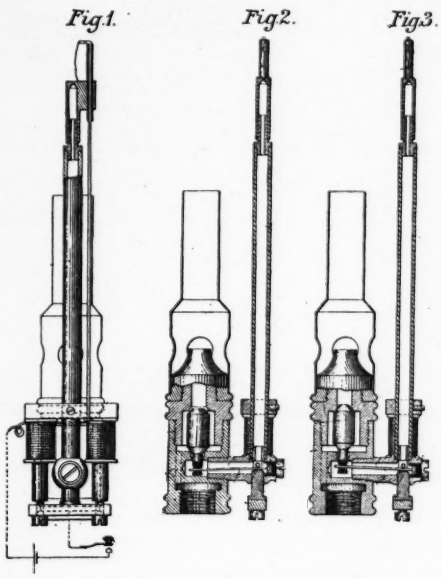
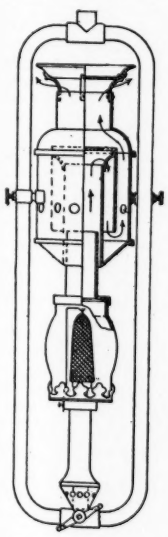


Fig. 1 is an end view of one form of gas-igniter, illustrating the disposition of the electro-magnet at the lower end of the pilot-jet tube, at the head of which is placed the igniting-device acting partly by means of initial heating by electricity. Figs. 2 and 3 are sections showing the valve arrangement in its two main positions respectively.

Incandescent Gas-Lamp.—Friedlander, H., of Leipzig. No. 4428; March 1, 1901.

The object of this invention is "to create a steady uptake of the burnt gases from incandescent gas-lamps, and thus to improve their lighting effect."

It is already known (the patentee remarks) that, by causing a strong draught above the lamp glass, the lighting power of the lamp is thereby increased. The means employed up to the present for producing this draught—viz., long tubes attached to the lamp glass—are most cumbersome, as the gasaliers to carry them have to be so long that they become unsightly objects, and can only be used in rooms of high pitch. A further fault of these long tubes is that their whole weight rests on the lamp glass; so that the lamp-glass holder has to be made very strong, and changing the lamp glass is a matter of difficulty. As the object of this invention is to induce an active draught, while avoiding the faults mentioned, such a form must be given to the waste-gas uptake that, although occupying comparatively little space, it has the same effect as the long-tube up-takes.



As shown, this attachment consists of several short tubes arranged concentrically; the centre one being arranged to slide axially up and down in the next larger one, whereas the rest of the tubes are held at a fixed distance from one another. The largest but one is closed at its top by a cover, and held suspended by simple arms; and the second and fourth size tubes are connected by a common floor. The whole attachment is fastened by clamping screws to the gas-pipe, and remains in position after having once been adjusted. When in use, the attachment becomes very hot from the repeatedly interrupted circulation of the hot gases; so that the cold air entering through the openings in it into the exterior tube is rapidly heated, and mixing with the hot waste gases is caused to rise steadily in the tube and carry off the waste gases with it.

Treatment of Gas Liquors.—Koppers, H., of Carnap, near Essen-Ruhr, Germany. No. 6272; March 25, 1901.

As in the ordinary process of treating ammoniacal liquors, the patentee remarks, the waste of ammonia depends on the quantity of the "tail-liquor," it is "of economical and sanitary importance to decrease the quantity of the noxious tail-liquor as much as possible." This is effected, according to the present invention, in the first place by the constant circulation of the ammoniacal liquor in any quantity after the separation of the free ammonia, and avoiding the use of fresh water for the ammonia washing. A further decrease of the tail-liquor can be obtained by using lime, for the purpose of liberating the bound ammonia, but not, as up to the present time, in the form of milk of lime, but lime in a thick pulpy condition.

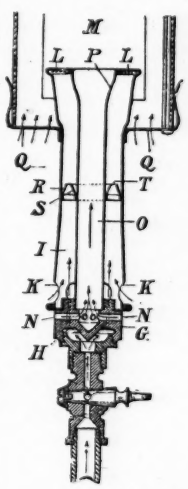
The suggested method consists in the use of a part of the ammoniacal liquor after being treated for the recovery of volatile ammonia, and therefore not containing any lime, and the water obtained from distillation for the washing of the ammoniacal liquor. The soft water, which to this end is taken from the purifying apparatus, is in the first place cooled, and then brought back to the scrubbers, whereby the supply of fresh water, except for the initial working, is entirely avoided, and the quantity of tail-liquor is considerably decreased.

In order to obtain a further decrease of the waste liquors, the same arrangement can also be used "as an economical method of reducing the quantity of water necessary for the addition of lime in the purifying apparatus." To this end, the lime is not supplied in the form of milk of lime (about 100 grammes of lime to a litre of water), but as a homogeneous lime pulp, by "pressing the lime as tapped after the separation of its water, without mudding, in the form of a stiff pulp, through the suction connection of a pump into the purifying apparatus, in which it is finally distributed through the added ammoniacal liquor."

Besides the advantages mentioned, the present method has, it is said, another important effect, in so far as it necessitates the use of entirely soft water for washing, containing only a minimum quantity of salts (about 0·1 per cent. for ammoniacal water in coke establishments), "whereby deposits are prevented as much as possible, and consequently the apparatus, which can seldom be cleaned, is better preserved."

Incandescent Gas-Burner.—Fürstenheim, F., of Berlin. No. 6262; March 25, 1901.

This burner for incandescent gas lighting is characterized "by a central admittance of air which compels the mixture of gas coming out in an annular cross-section to spread over the inner surface of the mantle, whereby complete combustion of the mixture of gas on the inner surface of the mantle, and uniform incandescence of the incandescent body for its whole extent, is obtained."

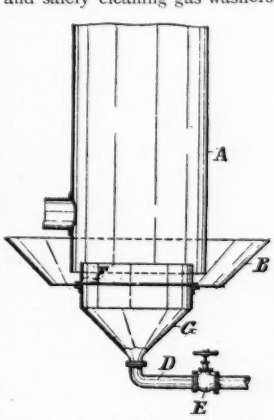


The gas, on passing through the cock, enters the head of the burner G, and flows through the orifices H into the chamber I, into which air enters through the orifices K. In the chamber I the mixing of the gas with air takes place; and the mixture passing through the orifices L is burnt underneath the mantle. The head G is provided with radial passages N, permitting the central admittance of air, which reaches the central pipe O, which widens into the shape of a funnel P at its upper end. The air leaving this funnel-shaped pipe forces the gas mixture being burnt against the interior surface of the mantle, so that combustion directly on its inner surface at all points is rendered possible. Admittance of air to the exterior surface of the mantle takes place at the opening Q.

In connection with this burner, mantles of exceptional size may be employed. To prevent the flame firing-back, a constriction is made in the mixing-chamber I, by means of two annularly bent opposed strips of sheet metal R and S, the upper parts of which are arranged to form an annular slot, which allows of the passage of the ascending mixture of gas, but prevents the flame from striking through to the head G.

Gas-Purifying Apparatus.—Sasse, F., of Cologne. No. 6735; March 30, 1901.

The object of this invention is to provide means for thoroughly and safely cleaning gas washers or scrubbers while at work from the considerable quantities of dust and slime which accumulate in the cisterns underneath them.



It is, as the patentee points out, of the greatest importance for the safety of working that the accumulations of slime should be removed without interrupting work; but with the methods at present in use, the washer or scrubber must be put out of operation, and it is impossible to prevent air from entering the washer while the latter is being cleaned. Danger of explosion when the washer is put into operation again is thus created. But all disadvantages are removed by the apparatus represented.

A is a cylindrical gas washer or scrubber, and B a water-cistern placed underneath it, at the bottom of which is a funnel C with an outflow-pipe D and a slide or valve E. F is a ring of sheet metal fixed in the cistern, with its upper edge extending a short distance into the washer, according to the pressure of the gas. When normally at work, the cistern is entirely filled with water; but when it is to be freed of slime (which accumulates more particularly in the funnel), the valve or slide E is opened, and the water flowing away rapidly carries all the slime with it. The arrangement of the ring F prevents the water-level from falling below its upper rim, and so "the absolutely safe and thorough cleaning of the cistern without interrupting work is rendered possible."

Making Incandescent Mantles.—Richardson, C. G., of New York. No. 6860; April 2, 1901.

The object of this invention is "to produce durable mantles of high illuminating power at a single simple operation by a process of moulding, as a substitute for the present method of producing mantles of the Welsbach type, by first saturating combustible fabric with suitable

mineral solutions, then shaping, then burning out, and finally coating the burned-out skeleton with some protective material, which again requires to be burnt off before the mantle is ready for use for illumination." Concisely stated, the process aims at producing a mantle by the single operation of moulding either a pliable mass or a liquid consisting of suitable incandescible material and a binding agent into the shape of the finished mantle, ready for use as it comes from the mould.

To mould a mantle from a pliable mass, the patentee proposes to take a solution of celluloid, preferably concentrated, and thoroughly mix and incorporate with it a solution or solutions of the salts or oxides of thorium and cerium, or other suitable incandescing earths. The mixture is then evaporated until a pliable mass of celluloid is obtained, with which the salts of the earths are incorporated. The mass is next moulded, by pressure, into the shape desired, which is preferably that of a hollow cone perforated with a great number of openings, so that it has the appearance of a grill or basket. By applying sufficient pressure, and with the application of heat during the process, the celluloid can be moulded into mantles exhibiting all the net-work of the ordinary Welsbach mantles. After the mantles are thus moulded, they are subjected to the action of a denitrating agent—such as ammonium sulphide. The mantles are then ready, and can be put on burners and used "without requiring any particular skill;" or they may be hardened by being subjected to the flame of a pressure-burner—*i.e.*, a bunsen burner supplied with gas under considerable pressure—before they are sent out. The burning-out consumes the celluloid, leaving a skeleton of earthy oxides.

To mould a mantle from the liquid, the liquid mixture of celluloid and incandescing earths (produced as described) is not evaporated to a pliable mass, but is injected under pressure into a mould, where it is left to harden and acquire any desired shape—preferably a net-work cone resembling the Welsbach mantle.

APPLICATIONS FOR LETTERS PATENT

10,332.—Snowden, E., "Stills for gas-works, and the like purposes." May 18.

10,336.—Koppers, H., "Heating of bye-product-saving coke-ovens." May 18.

10,337.—Koppers, H., "Coke-oven adapted to be worked with or without saving of bye-products." May 18.

7821A.—Thompson, W. P., "Gas-furnaces." May 25.

10,414.—Tournier, V. C., "Gas and oil engines." May 20.

10,437.—Casa Eguia, Le Comte de, and Bourrelly, G., "Gas-burners." May 20.

10,458.—Temperley, J. R. & J., "Chambers for the storage of coal." May 20.

10,474.—Wright, W. R., "Mantle supports." May 21.

10,500.—Lanchester, F. W., "Internal combustion engines." May 21.

10,501.—Hoshor, J. C., and Platt, T. E., "Conveyors for coal and other materials." May 21.

10,532.—Haddan, H. J., "Gas-engines." A communication from P. H. O'Donnell. May 21.

10,585.—Gray, R., "Gas-producers." May 22.

10,590—Veritys, Ltd., and Ebbutt, P. G., "Globe holders for street lighting." May 22.

10,591.—Rollinson, J., "Expansion framings and scaffolds, applicable for the erection of gasholders and tanks." May 22.

10,592.—Nuttall, J., "Gas-boiler." May 22.

10,626.—Wolff, L., "Incandescent gas-lamps." May 22.

10,672.—Smith, G. B. & E. W., "Locks for coin-freed meters." May 23.

10,686.—Edgar, W., "Street-lantern." May 23.

10,687.—Cooney, H., "Prepayment apparatus for the supply of gaseous or other fluids." May 23.

10,691.—Cox, W., "Coin-freed apparatus for delivering gas or like fluids." May 23.

10,709.—Scott-Snell, C., "High-pressure gas-lamps." May 23.

10,719.—Hofmann, J., "Generating elastic fluid for working engines." May 23.

10,720.—Podmore, A. E., "Lanterns for public lighting. May 23.

10,725.—Wise, W. L., "Acetylene generators." A communication from R. Klinger. May 23.

10,755.—Sutherland, W. C., "Gas-valve." May 25.

10,770.—Schofield, A., "Dry gas-meters." May 25.

10,775.—M'Donald, D. F., "Acetylene and other gas-lamps." May 25.

10,867-8-9.—Abel, C. D., "Manufacture of thorium, zirconium, and elements of the ytterite group." A communication from Siemens and Halske Aktien Gesellschaft. May 25.

10,880.—Dickson, W. K. L, "Compressors for high-pressure gas-burners." May 25.

10,881.—Dickson, W. K. L., "Mantle supports." May 25.

10,895.—Melhuish, A. G., "Gas or oil engines." May 25.

Gas Profits and the Rates at Goole.—In connection with the laying of a rate for the ensuing half year at Goole, it is stated that the Gas and Water Committee have had before them a motion that part of the unappropriated profit of £9000 belonging to the department should be handed over to the Council; but this was defeated by the casting vote of the Chairman. The finances of the town appear to be in an unsatisfactory condition; but there is no reason why they should be put into better order at the expense of only one section of the community.

Nuneaton Gas Order.—The Board of Trade have granted a new Provisional Order to the Nuneaton Gas Company (subject to confirmation by Parliament), which empowers the Company to raise £32,000 additional capital—entitled to a maximum dividend of 7 per cent. if raised by the issue of ordinary stock, or 5 per cent. if raised as preference stock. Upon this new capital, the Company are authorized to raise £8000 by the issue of debenture stock. A clause is inserted n the Order conferring upon the Nuneaton and Chilvers Coton District Council the right to purchase the works of the Company "within seven y ears from the commencement of this Order, but not afterwards."

LEGAL INTELLIGENCE.

Heavy Penalties for Infringing the Welsbach "A.U.R." Trade-Mark.

At the Marylebone Police Court, last Saturday week, William Sidney Smith and Charles Henry Foard, trading as proprietors of the "Holcroft Cycle Stores," were summoned for selling and possessing gas-mantles nearly resembling the trade-mark registered by the Welsbach Gas-Light Company. Mr. Bodkin supported the summons; Mr. Harold Brandon appeared for the defendants. A plea of "Guilty" was entered. It was stated that the defendants were not partners; Smith being the rated occupier not actually concerned in the business, and Foard the Acting Manager at the shop. Mr. Bodkin said the trade-mark of the Welsbach Company consisted of three letters "A.U.R.," which were stamped on the mantles. The letters on the mantles sold by the defendants, and on those found on their premises (which were searched under the authority of a warrant) were "A.J.R.," which the learned Counsel pointed out were calculated to deceive the purchasers. Mr. Brandon said that the mantles were purchased to supply a special order, and were not sold as Welsbach mantles. The boxes containing the mantles were different to those supplied by the Company. Mr. Rose convicted both defendants. He ordered Smith to pay a fine of £5 for selling, and Foard £14 for selling and possessing; and costs amounting to £5 5s. were allowed—in all £24 5s. The mantles seized were, on the application of Mr. Bodkin, forfeited.

MISCELLANEOUS NEWS.

ARSENIC IN COKE.

The Commission of experts appointed on behalf of the Manchester Brewers' Central Association some time since to investigate the causes of poisoning by beer have presented their final report. The dire effects of the poisoning caused considerable concern at the time; and this report has consequently been awaited with much interest. The signatories to the report are Sir Lauder Brunton, Dr. Stevenson, Mr. Alfred Gordon Salamon, Dr. Luff, Dr. Samuel Buckley, and Mr. J. Fletcher Moulton, K.C., M.P.

With the greater part of the report, our readers are only indirectly interested; but before quoting the portion which affects the market for gas coke, it may be stated, to show the exhaustive nature of the inquiry, that in all 663 samples of beer and materials were analyzed, of which 160 samples were beer. It was found that (excluding samples brewed from sugar) 20·8 per cent. of those examined contained arsenic derived from sources independent of the special source of contamination to which the outbreak must be attributed—viz., sugars, which derived their contamination exclusively from the employment in their manufacture of arsenicated sulphuric acid. This result necessitated an examination of all materials employed in brewing, in order to ascertain definitely whether or not arsenic was to be found in them, which would account for appreciable, though small, quantities in the beers. In these tests, 19 samples of malting coal or anthracite, and 12 of coke, were included. Summing up the results of the tests, the report says: "It is clear that the most frequent source of arsenical contamination in beer is the use of malt which has been kiln dried or malted with improper fuel containing arsenic. At the same time, the experience of the late outbreak has shown that precautions must be taken against the presence of arsenic in brewing sugars and other materials (except, perhaps, malt adjuncts) on account of the serious consequences of any carelessness in manufacture which might introduce arsenic." Accordingly, the Commission have considered what steps should in future be taken by brewers to protect themselves from any repetition of the recent disasters; and one of their recommendations is that brewers should make it a rule to require a written guarantee of freedom from arsenic with all purchases of brewing materials.

The section of the report in which gas coke is referred to reads: "When malt is contaminated with arsenic, the malt culms and kiln dust contain a much larger proportion of arsenic than the malt itself. This is accounted for by the fact that, when the green malt is loaded on to the kiln, and subsequently during the kilning, the physical structure of the culms renders them particularly liable to absorb any arsenious vapour that may be carried through the malt as the result of combustion of contaminated fuel, and that this liability is increased by the fact that from their position relative to the malt they are more exposed to the heated air. Our investigations have shown that the contamination of malt culms and kiln dust is chiefly due to the use of coke, and especially of gas coke. Inquiries made of the principal maltsters in England have elicited the practically unanimous opinion that there is no necessity whatever to employ gas coke in the preparation of malt. Nor, indeed, is there any real necessity to employ coke at all for purposes of malting. If the use of coke were dispensed with, a good many malt-kilns would have to be structurally modified; but the brewer would not fail to appreciate the benefit of such alterations. It might be necessary to use a small proportion of coke in the drying of amber malt, but in such case it would certainly be advisable to employ coke made from hand-picked and washed coal, and not gas coke. We recommend, therefore: (1) That the maltster be required to give a guarantee to the brewer that he does not employ gas coke in the preparation of his malt. (2) That the malt culms be regularly tested for the presence of arsenic. (3) If the culms be found to contain noticeable quantities of arsenic, that the kiln dust be at once removed, and the fuel employed be further examined for arsenic. (4) That wherever possible, the best anthracite be employed for malting purposes."

COST OF VARIOUS SYSTEMS OF STREET LIGHTING.

A Comparison by Mr. J. G. Newbigging.

In the present day, when the question of street lighting bulks so largely in discussable gas topics, any reliable information which adds to the stock of knowledge on the subject is welcome. Mr. J. G. Newbigging, the Engineer of the Manchester Corporation Gas Department, has been getting out some comparative figures; and he has kindly forwarded them to us for publication. The figures it will be noticed refer to ordinary gas lighting, electric lighting, and high and low pressure incandesent gas lighting; and they include interest on capital, maintenance, attendance, &c. As the past year's accounts of the Corporation Electricity Department have not yet been published, Mr. Newbigging asks us to take the figures given in connection with electric lighting as approximate. We may be sure, however, that figures coming from this source have not been put down without very careful inquiry. We reproduce the tables as follows :—

Cost of the Various Systems of Street Lighting, including Interest on Capital, Maintenance, Attendance, &c., per 1000 candles per hour.

GAS LIGHTING.

Flat-flame gas lighting	7·5d.
Low-pressure incandescent gas lighting, Kern and "C" burners, as in various parts of the city	1·96d.
High-pressure incandescent gas lighting (Infirmary Esplanade installation)	1·77d.

Gas charged at 2s. 6d. per 1000 cubic feet.

ELECTRIC LIGHTING.

Electric incandescent lighting	12d.
Electric arc lighting	3d.

Electric current at 4d. per unit.

WELSBACH INTENSIFIED LIGHTING.—INFIRMARY ESPLANADE.

First Cost.

	£	s.	d.
Cost of laying service-pipes and connections	86	6	8
Total cost of water connections by the Water Department	2	1	5
Cost of compressor, burners complete, and connections to compressor and gas and water meters	66	12	1
	£155	0	2

Maintenance.

March 15 to April 19, 1901 = 36 days.

Gas consumed, 83,000 cubic feet at 2s. 6d. per 1000 c. ft.	10	7	6
Water consumed, 25,560 galls. at 4·85d. per 1000 galls.	0	10	4
Mantles and rods. 70 mantles at 1s. 3d. each, and 1 rod at 1d.	4	7	7
Extra attendance, glazing, &c.	1	17	11
	17	3	4
Interest on capital, 10 per cent. per annum (one month)	1	5	10
	£18	9	2

Total number of hours burning	347
Total number of burners	35
Mantles renewed	70
Total cost for each hour's burning	12·76d.
Cost per 1000 candles per hour	1·77d.

NOTE.—Illuminating value of gas taken at 30 candles per cubic foot.

LOW-PRESSURE INCANDESCENT LIGHTING.

	£	s.	d.
Total cost of burners and anti-vibrator frames, including labour, &c.	751	0	0

Maintenance.

April 1, 1900, to March 31, 1901.

Gas consumed, 14,581,512 c. ft. at 2s. 6d. per 1000 c. ft.	£1822	13	9
Mantles renewed, 8680 at 6d.	217	0	0
Rods renewed, 459 at ½d, less 30 per cent.		13	4
Chimneys renewed, 1796 at 51s. per gross	31	16	1
	£2072	3	2
Interest on capital, 10 per cent. per annum	75	2	0
	£2147	5	2

Total number of hours burning	3762
Total number of burners (mixed "C" and Kern burners)	1713
Mantles renewed	8680
Total cost for each hour's burning	11s. 4·98d.
Cost per 1000 candles per hour	1·95d.

NOTE.—Illuminating value of gas taken at 18 candles per cubic foot.

CHESTER GAS COMPANY AND THEIR EMPLOYEES.

Profit Sharing and Pension Schemes.

The employees of the Chester United Gas Company recently assembled at the works for the purpose of meeting the Directors, who submitted for their consideration schemes under which the profits of the Company will be shared and pensions provided. The Chairman (Mr. John Gamon) presided; and he was accompanied by two of the Directors. The Secretary (Mr. J. Pye) and the Engineer and Manager (Mr. J. C. Belton) were also present. The Chairman opened the proceedings by expressing his pleasure at being present, authorized as he was to lay before the employees, on behalf of the Directors, a proposal which he believed would be for their distinct advantage. Having offered a few remarks on the constitution of the Company, he proceeded to say that it had long been under consideration that, in addition to the proprietors and the consumers, the workmen should have an interest in the well-being of the undertaking. The matter had been delayed for various reasons, but partly for the purpose of inquiring how schemes of a similar nature had answered in other places. There had now come a favourable opportunity for putting the project into operation. The price of gas at present was 3s. 4d. per 1000 feet, subject to discount; and the Directors thought they could see their way to make a reduction at an early date of 3d., which would work in favour of the scheme he had to propose. Further concessions were hoped for; but the 3d. was in view. He should not himself be happy until they brought down the price to 2s. 6d., which, under the scheme, would mean to each workman 9 per cent. bonus upon his wages. He then read the following outline of the scheme, which figures as a preface to the rules :—

In order to encourage economy in the manufacture of gas and a feeling of personal interest in the general welfare of the Company, the Directors are prepared to offer their officials and employees, subject to the following rules, a bonus on their ordinary salaries and wages, calculated according to the price of gas. The offer is made to encourage thrift; the bonus being entirely additional to the ordinary salaries and rates of wages, and not in lieu of any benefits (legal or otherwise) which the officials and workmen are entitled to; and facilities will be given (if desired) to employees to improve their position in life by investing their accumulations of the bonus in the stock of the Company. The bonus to be calculated on the ordinary salaries and wages, exclusive of overtime, will be at the following rates: If the price of gas is at or above 3s. 4d. per 1000 cubic feet, no bonus; if at 3s. 3d., 1 per cent.; at 3s. 2d., 2 per cent.; at 3s. 1d., 3 per cent.; at 3s., 4 per cent.; at 2s. 11d., 5 per cent.; at 2s. 10d., 6 per cent.; at 2s. 9d., 7 per cent., and so on. In the complete success of the scheme the Directors feel great interest; and they confidently recommend it to all their employees as conferring upon them a distinct benefit and advantage, while inducing them to take interest in their work and giving them a new motive for endeavouring to promote the prosperity of the Company. The result aimed at is more efficient and economical work; and the Directors do not doubt, if this result is attained, they will be enabled to make continued reductions in the price of gas. Should this scheme not succeed in its objects, the Directors reserve to themselves the power to terminate the same on giving not less than six months' notice, to expire on June 30 in any year; and no bonus in addition to ordinary wages will thereafter be given.

Continuing, the Chairman remarked that under the scheme every workman on the permanent staff would participate in the prosperity of the Company. The bonus, given in addition to wages, would begin from the 30th of June; and on the 30th of June, 1902, every man would have earned a certain amount of bonus according to the reduction in the price of gas that they were able to make. He did not pretend for a moment to say that this was a one-sided arrangement, which was entirely an act of benevolence by the Directors to the workmen. The Directors had no right to use the money of the Company by way of benevolence. It was, however, hoped that the prosperity of the concern would be very much helped by the interest the men would find in promoting economy in their work and in preventing waste of stores, coal, &c., regularity in keeping time, taking care that two men were not employed to do one man's work, and in seeing that there was no loafing or idleness. From this, better work and improved working by the men would result. The proprietors would benefit in having a sounder and better undertaking, and more sure and regular prices for their gas; and the consumers would benefit because every 1d. per 1000 cubic feet reduction to the consumer would mean 1 per cent. on the wages of the men. They were prepared to admit every man into the receipt of the bonus; and he would be required to sign an agreement, which was nothing more than an ordinary arrangement between master and employee. This agreement would last in the first instance for twelve months. There would be no distinction of men. One other condition was that everyone admitted to share the bonus must be a member of a benefit club. This was for the benefit of themselves, their wives, and children, and to encourage thrift and the habit of saving. A Committee of Management would be elected, to consist of the Chairman of the Directors, two members to be elected yearly by the Board, and two members (who should themselves be profit-sharers) to be chosen by the other profit-sharers yearly by ballot. The Committee would serve as a medium of communication between the men and the Directors in all matters affecting the workmen. The scheme was not a new-fangled notion. It had been tried, and was being tried now, in a great number of concerns similar to their own—notably, and with great success, in the South Metropolitan Gas-Works, where he had had an opportunity of inspecting its working. The rules they proposed were very much modified from those of the South Metropolitan Company. They had made them to fit the Chester workmen; and he did not think that they would be found to be anything but perfectly fair, and what they could wish for themselves. The South Metropolitan scheme set forth that "facilities would be given to the workman to invest his savings in stock." He (the Chairman) was perfectly astounded when he looked through the South Metropolitan men's stock-book, and found such a great number of them had at least £10 of stock. Some of them had more, and one or two had £100 of stock, and were proprietors in the Company, and could vote at the meetings. He hoped they in Chester would arrive at this. He should like each one of them to have £100 of the Company's stock. But they were not tied to stock; they could do what they liked with their money. Some of them might wish to buy a house with it, or invest it in another way; but every facility would be given to the men to become proprietors in the Company. He had also to put before them a system of pensions which had been devised by the Directors. Of course, they all knew that for a long time there had been a voluntary system of pensions, by which they had a certain number of old workmen, who had spent their lives on the works, who were in receipt of pensions. Such a system depended upon the good-will of the Directors, and must be rather uncertain in practical working as to the amount of the pension. The scheme he put before them fixed the sum to be paid to any workman who should continue in the Company's employment sufficiently long to be entitled to a pension. The scheme was briefly as follows :—

The Directors are prepared to grant to every workman of 25 years' service

or more, upon attaining the age of 65, or if permanently incapacitated by illness or accident, and of exemplary conduct, and not less than 50 years of age, a pension of one-third of his full ordinary weekly wages; and where the pension includes a fractional part of 6d. the full 6d. will be granted. The pension will be calculated on the average rate of wages during the period of service; and, in cases where the period of service is less than 25 years, the pension will be less by 1-25th part for every year less than 25 years of service. Every workman in the Company's employ, upon attaining the age of 65, shall be retired and pensioned, unless the Directors are satisfied that any such workman is, notwithstanding his being 65 years of age or upwards, fully capable of regularly earning his wages, when they will permit him to continue on the pay-sheet as they shall think just and expedient.

He might mention that the stokers must not confound the pensions they had been receiving as stokers with the pensions under the scheme. The bonus which they had hitherto been having would be added to their wages, and treated as wages. On the declaration of the bonus on the 30th of June in each year, the whole of the bonus would become the absolute property of the employee. Supposing a workman earned a bonus of £5, one-half would be retained by the Trustees, to accumulate for his benefit until it reached £10, when he could withdraw it. The other half might, at the option of the employee, be left with the Company, to accumulate at interest of 4 per cent., or it was payable in cash. It was intended that whatever was done should be to the distinct advantage of each employee.

At the conclusion of the Chairman's remarks, the foreman (Mr. W. Strong) proposed a vote of thanks to him, and expressed the belief that the scheme would work well. Mr. Pye, in supporting the proposition, alluded to the warm feelings which had always existed between the Company and their employees. The vote having been heartily accorded, Mr. Gamon returned thanks, and again referred to the schemes as being an advantage to all.

SOUTH AFRICAN LIGHTING ASSOCIATION, LIMITED.

The Twelfth Annual Meeting of the Association was held recently, under the chairmanship of Mr. D. Ford Goddard, M.P., when the Directors reported that the continuance of the war in South Africa had again affected the normal progress of the Association at both their stations, while the bad state of trade, due to the same cause, had prevented any extension of their operations. Out of the balance of the profit and loss account, including the amount brought forward from 1899—£11,530 in all—an interim dividend of 4 per cent. had been paid, and £2000 had been placed to reserve. A final dividend of 6 per cent. (making 10 per cent. for the year) was recommended and agreed to, leaving £3530 to be carried forward to this year's accounts. The report concluded with an expression of regret at the death of Mr. William Woodall (who had been one of the Directors of the Association since its inception), and the statement that Mr. Henry Woodall had been elected to fill the vacancy. The report was adopted, on the motion of the Chairman, seconded by Mr. James Mansergh. Mr. Corbet Woodall, as Consulting Engineer to the Association, made some complimentary remarks as to the manner in which the local officers had carried out their work during the recent troublous times—especially in the matter of landing coal at Port Elizabeth and forwarding it to Grahamstown.

CAPE TOWN AND DISTRICT GAS COMPANY.

The Annual General Meeting of this Company was held on Tuesday last, at the Offices, New Broad Street House, E.C.—Mr. J. E. Lilley, J.P., in the chair.

The Secretary (Mr. H. Yuill) read the notice convening the meeting; and the report of the Directors was taken as read.

The Chairman said it was a very great pleasure to the Board to be able to present so satisfactory a report as this one was; and he could assure the shareholders that no attempt whatever had been made to give a rose-coloured view of the position of the Company. It must be patent to everyone who perused the report, even superficially, that the Company had had an excellent business year, and that the results, notwithstanding the stress and difficulties which had been experienced, and which had given the Board great anxiety at times, were most satisfactory to all who were interested in the welfare of the undertaking. Turning to the balance-sheet, it would be seen that there was no change in the amount of capital issued; the figure remaining at £250,000. With regard to the next item—insurance account, £248—it might be explained that the Company were to an extent their own insurers of goods sent to Cape Town by steamship, instead of getting the risks underwritten. On the credit side of the balance-sheet, the total capital expenditure was £216,261, as compared with £211,698 in the previous year's accounts. There had thus been an expenditure on capital account during the twelve months of £4563, which was distributed as follows: New works £1632, mains and services £2324, new and additional public lamps £335, and slot meters £272. Notwithstanding the fact that the electric light is in existence in the entire neighbourhood of Cape Town, the Company were still going ahead in the matter of public lighting. There was a considerable increase in the number of public lamps provided—not in Cape Town proper, but in the adjoining Municipality of Woodstock. Stock at Cape Town and in transit showed a large increase; being £24,356, against £18,565 last year. The whole of this increase was accounted for by the extra amount of coal they had at Cape Town, in transit, and lying at the Docks waiting to be delivered. Sundry debtors figured at £18,757, as against £14,415. This item had been gone into very carefully by the Cape Town Auditors; and they seemed to be perfectly satisfied with it. The amount only represented about a quarter's collection from the customers, so that it was not very serious. The result of the balance-sheet was to show a profit of £14,684. Turning to the revenue account, it would be seen that the cost of manufacture and distribution of gas amounted to £31,351, as against £26,060 in the previous year; but as they had made over 15 million cubic feet more gas during the past twelve months, it was only natural that this item should show a considerable increase. As was stated in the Directors' report for the preceding year, the Company had a very favourable contract for coal running, which it was anticipated would carry them pretty well through 1900. This surmise proved correct; but the Board were unable to control the freight charges, which were exceedingly heavy. This was largely owing to the difficulty experienced in unloading vessels when they reached Cape Town. Anyone who saw the harbour would understand this. Table Bay was full of vessels, and the Government took precedence of everything and everybody; so that merchandize of all kinds had to wait its turn. Furthermore, the facilities for unloading in Table Bay were very inadequate, though the Harbour Authorities were taking measures to improve this state of affairs. The facts he had mentioned had, of course, a very important bearing on the question of freights. In many cases, too, the Company had had to incur the expense of lightering the coal from the vessels, instead of having it unloaded at the quay. In their almost extremity, the Board purchased some Colonial coal, though he was sorry to say the Colonial coal they had tested hitherto was very inferior to what they exported from this country. Nevertheless, they were bound to purchase some of it then. Later on, however, the Harbour Board granted special facilities for the landing of the Company's coal, as they recognized the importance of keeping up the supply. Then, of course, they had carbonized 1841 tons more coal during the year, to furnish the extra quantity of gas. The average make of gas per ton had been less satisfactory, because, as he had mentioned, the coal which they bought in the Colony was of a very much lower quality than that sent out from England. However, the falling off had not been very serious; the average make being 9811 cubic feet per ton of coal, as compared with 10,000 cubic feet in the previous year. This had been a disappointment to the Board, who had looked forward to being able on the present occasion to report an increased make per ton of coal. Besides the addition of practically 50 per cent. to the cost of freight, the manufacturing charges included wages paid to some men who volunteered to go to the front when the war broke out. The places of these men were being kept open for them; and the Company were during their absence paying half their wages to the families they left behind them. Repairs and renewals of works, &c., cost £4859, as compared with £4603. The Board had thought in past years that the expenditure under this head had been excessive; and they had hoped that on the present occasion there would be some reduction. But it seemed that this was not to be. In the early part of last year, a serious accident happened to one of the gas-holders, which put it entirely out of use. It was impossible to say how the accident occurred; but, of course, they were subject to very strong winds in Cape Town. At any rate, the holder was injured, and it cost £700 or £800 to repair it. Rents, rates, and taxes amounted to £1234, as against £1379; but this reduction merely arose from the fact that the Company had temporarily let one of their stores. Discounts, allowances, and bad debts amounted to £1741, as compared with £600. For many years past nothing had been written off for bad debts; and the Directors had come to the conclusion that about £600 should now be written off under this head. The Company had also been giving some of the larger consumers a more liberal discount than in previous years. Many people connected with gas undertakings in England would be surprised at the size of some of the Company's accounts. The average amount of their customers' accounts—little and big—was not under £20. The two largest newspapers in Cape Town were now printed by means of gas-engines; and cooking-stoves were largely on the increase. On the credit side of the revenue account, the gas-rental amounted to £49,896, as against £41,209. Notwithstanding the competition of the electric light, the demand for gas continued to grow. During the year the ordinary consumers increased by 136, and the automatic consumers by 38. The returns from residuals were very much larger. Not only had they more coke to sell, but they obtained a higher price for it. The difficulty experienced in landing coal affected everybody in the Colony, and so there was a great demand for their coke as a substitute. The profit on the sale of fittings was only £716 on the present occasion, as compared with £1413. This was accounted for to an extent by writing down the value of the stock. It would be seen by the accounts that a bonus on profits of £200 was paid to the Manager; this being in addition to his salary. There was an amount of £19,384 left to dispose of, after paying the debenture and preference interest. Of this amount, £4500 was paid away in an interim dividend at the rate of 9 per cent. per annum for the half year ended June 30; and out of the balance the Directors proposed the payment of a final dividend on the ordinary shares at the rate of 11 per cent. per annum for the six months to Dec. 31, and to place the sum of £7500 to a reserve and contingency account. This would absorb a further sum of £13,000, and leave £1684 to be carried forward to next year's accounts. He thought the shareholders might take it for granted that the dividend of 10 per cent. per annum would be maintained. Owing to the extra cost of coal and freight, the Board had felt compelled to raise the price of gas from 9s. 2d. to 10s. per 1000 cubic feet; but they intended to reduce it again at the earliest possible moment. Mr. Ohlsson had felt compelled to resign his position as Chairman of the Cape Town Board; and the affairs that side had now been placed in the hands of Mr. A. C. F. Gore. The Company had also sent out a new Manager in the early part of the year. In view of these changes, it had been arranged that he (Mr. Lilley) should visit the works, and see how things were going on. He was pleased to say that he found the new Manager (Mr. E. P. Reilly) a thoroughly competent man. In London, the Company were well served by all their officers; and the same was the case in Cape Town. The storage accommodation at the works was at present very inadequate; and it had been decided to erect a new holder. The cost of this would be considerable; but the Directors saw their way to meet it. He concluded by moving the adoption of the report and accounts.

Mr. H. R. Savory seconded the motion.

Mr. Fousset asked why the Directors did not pay off the debentures. He thought 6 per cent. was a very high rate of interest to pay.

The Chairman replied that the debentures could only be paid off, before the year 1910, at a premium of 10 per cent.; and therefore the Board did not think it advisable to entertain the idea.

The motion was then carried; and the proceedings terminated with the re-election of the retiring Director (Mr. R. A. Fairclough) and the Auditors (Messrs. C. F. Kemp, Sons, and Co.).

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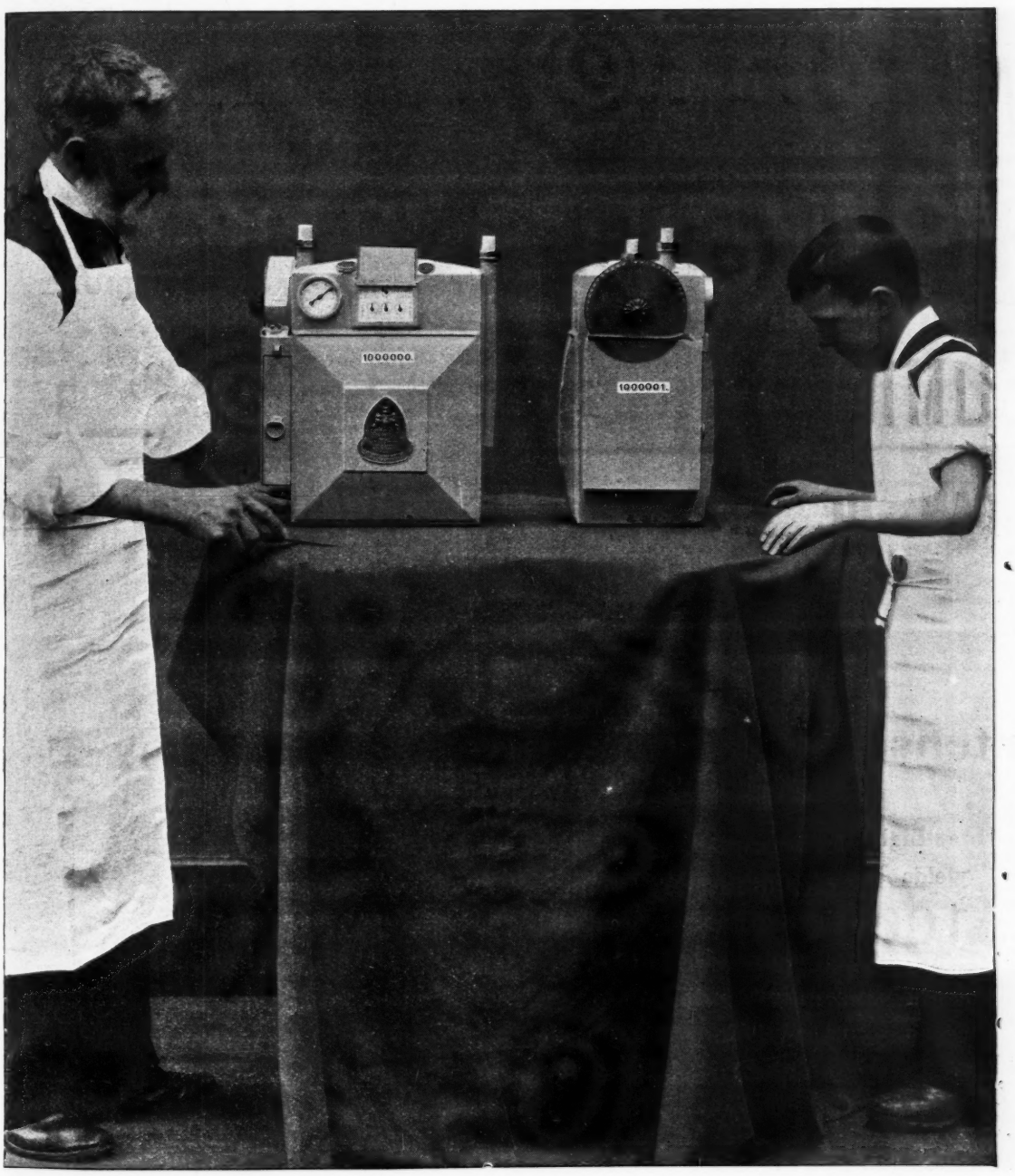

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5 MONTHS' SERVICE, 1901.

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SINGAPORE GAS COMPANY, LIMITED.

The Transfer Question.

The Annual General Meeting of this Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. SAMUEL SPENCER in the chair.

The SECRETARY (Mr. R. M. Christie) read the notice convening the meeting; and the Directors' report and the accounts, which were referred to in the "JOURNAL" for the 14th ult., were taken as read.

The CHAIRMAN, in moving their adoption, said the meeting was fixed at a later date than usual in the hope that the Directors would have had a cable from the Municipality of Singapore, confirming the agreement for the sale of the works; but he was sorry to say nothing had been received up to that morning. As the shareholders were aware, it was thought the transfer of the works would take place on April 1; but, owing to the Municipality requiring the transfer to be made in legal form, it was found (in reply to a cable sent by the Directors) that they could not possibly carry it through by the date named. It therefore became necessary for the Directors to cable that, without the agreed price being paid, the transfer could not be effected; and, in consequence, arrangements had to be made, at the earliest possible moment, for continuing the business until the transfer could be concluded. Of course, a further quantity of coal had to be bought. This had been procured on favourable terms; and any additional profit made until the date of the transfer would be to the Company's benefit. The Municipality had the draft agreement before them now; and in due course the Directors would hear from them. Only that morning, the Board had a letter from their Manager (Mr. Albert Ford), saying that he received the draft agreement on May 6; but as the mail was leaving that day, there was no time to reply to it. But that was 24 days ago; and one would have thought that by this time the Municipality might have cabled. However, he supposed that the work of the Municipality at Singapore had to undergo the same routine treatment as the work of municipalities here; and so they had required longer time than the 24 days which had elapsed. Turning to the accounts, it would be noticed that the results of the year's working had not been so profitable as could be wished. At the same time, considering the enormously increased cost of coal, and the unusual expenses that had been incurred during the year, the accounts must, he thought, be regarded as fairly satisfactory. The Board had therefore decided to declare the same dividend as last year; leaving nearly £700 to be carried forward. As they were so near the winding up of the Company, he did not think it necessary to comment further upon the accounts.

Mr. W. T. BATTEN seconded the motion.

The CHAIRMAN, replying to Mr. H. W. Smith, stated that the price paid for the additional supply of coal was 27s. per ton, as compared with 32s. or 33s. previously. It was Lampton (Australian) coal.

Mr. DYER did not agree with the Chairman that the accounts were altogether satisfactory. An enormous increase in the cost of coal and a smaller rental did not seem to him to be the correct thing. They had paid £1335 more for coal than in the previous year; and the gas-rental ought to have been more instead of £224 less. He thought the Directors had made a mistake in not increasing the price of gas. He commented upon several items in the accounts, the most favourable of which he found was a decrease of £683 in the loss on exchange.

The CHAIRMAN pointed out that his remark was that the accounts were "fairly satisfactory." As to the price of gas, their circumstances in Singapore were different from those of an English company. Under their contracts, they could not alter the price to the Municipality. Besides which, as the Municipality took a little more than half the consumption, it only left half on which they could have increased the price. Then, again, as they had expected to be taken over on April 1, it was considered that their best policy was not to raise the price; but had they known they were going on so long before the transfer, they might have taken another view of the matter. However, they were working under altogether better conditions at the present time.

Mr. B. GREEN and Mr. R. G. RICE endorsed the Chairman's remarks on the subject—the latter saying that, if they had increased the price, they would have brought a hornet's nest about their ears; and this it would not have been wise to do at the present juncture.

The motion was unanimously carried.

A dividend at the rate of 4 per cent. per annum (making 3½ per cent. for the year) having been declared,

The retiring Directors (Messrs. A. E. Stephenson and B. Green) were re-elected; as also the Auditors (Messrs. Magnus Ohren and Thomas Guyatt).

This concluded the ordinary business of the meeting.

The CHAIRMAN then made a statement as to the course of the transfer question from the date of the extraordinary meeting of the shareholders in January last, at which it was agreed to cable an acceptance of the offer of the Municipality for the works. This was done; and the Directors for a time felt fully assured the money would be paid on March 31. About a fortnight before that date, being anxious as to the position of the Company, a cable was sent asking whether the money would really be paid on March 31. In answer a message was received, saying that legal difficulties were beginning; that the Municipality could not pay the money then, but that they proposed to take possession of the works, and deposit the money in their joint names. The Directors did not think that this would conform with the feeling of the shareholders; and so they cabled to the effect that, without the cash, the works could not be handed over. The Chairman mentioned the various steps that had been taken, in consultation with the Company's Solicitor; and then he again referred to Mr. Ford's letter received that morning, in which he said that efforts were being made to bring about the transfer on June 30, and that the draft agreement (alluded to earlier in the proceedings) had been received. Immediately a cable was to hand saying that the agreement had been executed, the necessary notice would, the Chairman said, be sent out calling a meeting of the shareholders, in order that Liquidators might be appointed.

Mr. RICE also made a statement, which clearly showed that the present situation was, in large measure, due to the legal formalities which had cropped up.

The CHAIRMAN also read the last three cables. The first was from Mr. Ford, as follows: "Municipal Solicitors advise deposit purchase money local bank, joint names Commissioners and Company, until after completion of contracts." To this the Directors replied: "Solicitors insist no transfer until cash cabled, or Commissioners undertake by deed pay dividends, debenture interest, and expenses until purchase completed." To this Mr. Ford answered: "Municipality will remit by telegraph when conveyance received. Send without fail by first mail draft agreement to purchase." This (as previously stated) was done; and the Directors were now only waiting for a cable to say that it had been completed.

After a little conversation, the Chairman, Directors, and officials were thanked for their services; and the proceedings terminated.

LANCASTER CORPORATION GAS UNDERTAKING.

Mr. Armitage's Annual Report.

The report which Mr. C. Armitage, the Engineer and Manager of the Lancaster Corporation Gas-Works, annually addresses to the Chairman and members of his Committee has been issued. It deals with the results of the working in the year ending on March 25 last, and opens with a reference to the revenue account. The total receipts, including bank interest, less commission, are shown to have been £30,614; and the expenditure £22,598—leaving a gross profit of £8016, which amount, under the heading "net revenue account," is divided up as follows: Interest on stock and mortgages, £3819; redemption fund, £1611; income-tax, £494; borough fund, £1000; reserve fund, £1091. The reserve fund now amounts to £13,309. The £1611 added to the redemption fund during the year makes the total, with interest accrued, £17,462. Nothing was added to capital account during the year; but £2699, the cost of new mains, services, meters, and prepayment stoves, was charged direct to revenue account. The receipts for gas by ordinary meters amounted to £16,749—being an increase of £1776. It is satisfactory to learn that prepayment meters have become very popular. Up to date 1570 have been fixed; and the receipts for the year reached £2293—being an advance of £701. The receipts for public lamps increased by £98.

The apportionment of the average price received per 1000 cubic feet of gas sold is given by Mr. Armitage as follows: Net cost of gas, 1s. 3·32d.; new mains, services, meters, and prepayment stoves, 4·01d.; interest on stocks and mortgages, less interest from banking company, 5·44d.; redemption fund, 2·39d.; borough fund, 1·49d.; reserve fund, 1·62d.—the average price received being 2s. 6·27d.

The average cost of coal and cannel was 15s. 9·88d. per ton, as against 12s. 5·68d. in the preceding year. Coke contributed in return 7s. 4·21d., and the products from tar and ammoniacal liquor 4s. 2·85d.—making a return from residual products of 11s. 7·06d. per ton of coal carbonized, or 73·23 per cent. of the cost of coal. Tar products, as well as sulphate of ammonia, Mr. Armitage mentions, have decreased in price since his last report, and have now a downward tendency.

The working statement shows that the total quantity of gas sold during the twelve months was 161,480,657 cubic feet—an increase of 7,609,195 cubic feet, or 4·71 per cent.

At last week's Meeting of the Town Council, the foregoing report was presented, together with one by the Borough Accountant (Mr. W. Clough) dealing generally with the finances of the various departments. In reference to the Gas Department, Mr. Clough stated that the net profits from the undertaking during the year were £2091, of which £1000 had been transferred in aid of the borough fund and £1091 taken to the gas reserve fund. The total net profits were less than those of the previous year by £518. Compared with the preceding year, the receipts from the sale of gas (private consumers and public lamps) showed an increase of £2575; the receipts from residuals were also more by £1214; while the increase in the cost of coal was £3049. Out of the reserve fund £1141 had been expended; and the amount now to the credit of the fund was £13,309. Adding this to the sum in hand or invested on debt redemption account, £9826, and unexpended on capital account, £1526, it gave a total of £24,662, against a capital debt at the present time (taking the old Corporation stock at nominal value only) of £132,579.

Alderman HELME, in moving the confirmation of the minutes of the Gas Committee, stated that the gas sold during the year was nearly 161½ million cubic feet, or an increase of 7½ millions. The receipts had advanced from £27,021 to £30,614; and the expenditure had increased from £18,632 to £22,598. The balance of receipts over expenditure was £8016. The increase in the cost of coal for twelve months was £3049; but it would have been greater had they not had three months' stock at the old prices. The gas receipts had increased by £2575, of which £959 was due to the increase of consumption, and £1616 to the increased price charged during nine months of the year. There were now 1570 prepayment meters and 630 prepayment cookers in use, against 1230 and 340 respectively last year; and the receipts from this source were £2293. The total quantity of gas now made was 170,685,000 cubic feet, as against 51,578,000 cubic feet in 1880, when the Corporation purchased the undertaking. The extension of the works which this increase had necessitated had been provided for out of profits; and the town was in the happy position of owning and holding works that were thoroughly equipped, and which produced more than three times the amount of gas that they did when bought.

Alderman BOWNESS seconded the motion, which, after a little discussion, was carried.

Brynmawr Water Supply.—The Brynmawr District Council have voted the sum of £8000 to the improvement of the water-works and distribution system. The plans are to be submitted at once to the Local Government Board.

BOLTON CORPORATION GAS SUPPLY.

Annual Report and Accounts.

Mr. James Horrocks, the new Chairman of the Bolton Corporation Gas Committee, did not enter upon the work of that office at an altogether propitious time for showing a profitable year's trading; but on looking into the accounts which he and his colleagues and their Engineer (Mr. William Smith) have just issued, there are everywhere good indications of larger trading and development of business.

The report of the Committee (for the year ending March 31) opens with the following tabulated information:—

	1901.	1900.
Tons of coal and cannel carbonized	101,187	98,477
Average cost per ton of same, delivered on the works and trimmed	14s. 6¾d.	11s. 0d.
Percentage of cannel used	4·10	8·20
Gas made in cubic feet	1,022,510,000	984,416,000
Do. do. per ton of coal carbonized	10,105	9,996
Gas accounted for per ton of coal carbonized	9,649	9,641
Gas unaccounted for per cent. through leakage and condensation	4·50	3·55
Maximum quantity in cubic feet supplied in 24 hours during the year	5,974,000	6,356,000
Minimum quantity do. do.	860,000	815,000

The average quality of the gas supplied, as reported by Mr. Walter Ratcliffe, F.C.S., was as follows: Illuminating power, 18·26 candles; sulphur, 16·43 grains per 100 cubic feet; ammonia, 3·579 grains; and sulphuretted hydrogen, none at any time.

As a consequence of the largely increased cost of coal, and notwithstanding a partial recovery by the improved value of residuals, the available profits for the year were reduced from £33,748 in the preceding year to £24,593 for the present year. Of this amount, £4583 has been transferred to the reserve fund; and the balance, £20,000, voted in aid of the district rates. The Committee remark that they look forward to considerable reduction in price from the new coal contracts about to be entered into; but any relief so experienced will, it is feared, be more than neutralized by lessened income from residuals.

Regarding the works, it is stated that at the Lum Street station, a considerable enlargement of the gas-washing plant has been carried out during the year, which will have the effect of still further reducing any ammoniacal impurities present in the gas at these works. In connection with the Gas Street works, it is mentioned that the Bengal Square site has been of the utmost value to the department in affording storage accommodation for coal; it being found absolutely necessary to provide in advance for winter requirements much larger stocks than was formerly found necessary. The capacity of the apparatus for stacking and loading coke at these works has been largely increased during the year. This will tend to greater expedition in loading, and greater economy of working. A scheme for the enlargement of the trunk gas-mains was brought to a completion during the year.

Respecting the Lighting Department, twelve months ago the Council sanctioned a scheme for placing incandescent lamps along the various tramway routes in the Central, Rumworth, and Halliwell districts. This work has received careful attention; and nearly all the routes have been completed. It is intended to finish the whole ready for the coming winter season. The improved lighting of these routes is very effective, and is much appreciated. Special attention is also being given to the work of improving, where needed, the lighting of the streets generally. The number of lamps throughout the borough on March 31 was 4795, and the number in Turton and Horwich districts 710—making a total of 5505 lamps supplied with gas, as against 5160 at the corresponding date last year.

In the revenue account, it is seen that the total receipts for gas were £117,231, as compared with £109,008; and the residuals produced £48,649, as against £39,354. On the gas-fitting trade, after deducting cost for wages and materials, there was a return of £1548. Sundry items made up the total receipts to £168,273, as compared with £151,155. Under the heading of manufacture, £102,014 was spent, as against £78,649. The total expenditure was £118,645, compared with £93,340. The balance was £49,628, against £57,815. The increased expenditure, it will thus be observed, was considerably more than the reduced amount of available profit.

NEWBURY CORPORATION GAS SUPPLY.

The annual report and balance-sheet of the Gas Department were presented at the last meeting of the Newbury Town Council; and the Committee, considering the accounts were satisfactory in every respect, recommended: "(1) That the price of gas to ordinary consumers be reduced from 3s. 10d. to 3s. 8d. per 1000 cubic feet, with the same discount as before. (2) That consumers who use prepayment meters be supplied with an additional foot of gas for every penny put into the meter. (3) That the charge for public lamps be reduced from £3 to 55s. per lamp." They also unanimously recommended that the Manager's salary be increased by £25 per annum.

Alderman SMITH, in moving the adoption of the report, said it was a source of pleasure to note the gradual increase in the number of consumers. He remembered the struggles of the undertaking in former years, and was therefore glad, with others, that those difficulties which had caused such anxiety were gradually disappearing. Much of the present prosperity of the gas-works was due, not only to the introduction of the slot-meter system, but also to the lowering of the price of gas, which had induced many residents to become consumers, while smaller consumers had had the gas placed within their reach. As to the work of the past year, the quantity of coal carbonized was 3879 tons, as against 3507 tons in the previous twelve months, or an increase of about 371 tons; while the quantity of gas produced had risen from 34,290,500 cubic feet in 1900 to 38,248,200 cubic feet, or an increase of nearly 4 million feet. The increased price of coal had proved a serious matter; the average cost per ton having been 21s. 3d., as against 17s. 8d. per ton in the previous year, the difference representing an increased expenditure of £695 for coal alone. The difficulty had, however, been satisfactorily overcome. Some alteration in the quality of the coal used for carbonizing had been suggested by the Manager; and so far from the results proving less satisfactory, as had been feared, the cheaper quality coal had produced more gas. The yield per ton was 10,816 cubic feet, as compared with 10,743 cubic feet in the preceding year. The unusual consumption of coke had also been remedied. With an increased output of gas, the amount used this year was 7 chaldrons less. Gas unaccounted for showed an increase of 265,000 feet; but the Auditors had informed him that the percentage of 7·42 on the output of gas which was unaccounted for might reasonably be expected. He thought that the results of the year's working had justified the action of the Committee in reducing the price of gas to the consumers, and in introducing the slot-meter system. The gross profit on the year's working amounted to £2659, as against £2350 in 1900, or an increase of about £300, after paying the extra sum for coal owing to the advance in prices. A good deal of this success was due to the excellent manner in which the undertaking was managed. The Manager certainly deserved the increase in his salary.

Mr. DAVIS seconded the motion, which was adopted.

GAS TESTING AT COVENTRY.

Mr. J. F. Simmance was recently consulted as to the arrangements for gas testing at Coventry. The examinations of the gas supply are made, on behalf of the Watch Committee, at the Technical Institute; and it is evident from the advice given by Mr. Simmance that the conditions surrounding the testing there have not been altogether fair to the Gas Committee or to the gas supplied. He is satisfied that the photometer has not hitherto been in a position which would represent the quality of the gas being supplied to the town, for these reasons: "(1) The service is of some considerable length, and subject to differences of temperature at various parts of its length. (2) The service is taken through a separate meter, instead of being taken direct from the street main. (3) The photometer is placed in a room with no adequate means of maintaining a correct temperature, and with apparently no means of ventilating the end of the room in which the photometer is situated. (4) The floor is not free from vibration. (5) The tests are made at too great intervals of time to keep the instruments in a condition to ensure accuracy, and to burn the gas for some hours before each test does not meet the objection, and emphasizes the ventilation difficulty. The photometer is in perfect order; and, if used more frequently and under better conditions, would serve as a check upon the quality of the gas supplied to the town." Mr. Simmance consequently recommended another room on the ground floor, in which, by being adapted to the conditions mentioned, results concordant with the gas-works tests should be obtained. He also suggests that, by an agreement between the various parties, candles should be abolished in Coventry as the standard of light, and that the 10-candle pentane lamp should be substituted. The adoption of this standard, he says, would do away with many causes of irregular tests, and would, by reason of the greater facilities afforded for rapid yet accurate examinations, enable tests to be more frequently made—say, five times per week, without occupying much of the examiner's time, either at the gas-works or town testing-station. The Gas Testing Sub-Committee have presented a report to the City Council in which they have embodied the suggestions of Mr. Simmance. Tests for illuminating power, however, are to be made weekly, and for chemical composition monthly. The City Council have adopted the report.

LIMERICK CORPORATION GAS UNDERTAKING.

The Gas Manager Surcharged.

The report of Mr. Courtenay Crafter, the Local Government Board Auditor, on the audit of the accounts of the Gas Committee of the Limerick Corporation for the year ending the 31st of March last has lately been submitted. He shows therein that no less a sum than £54,000, with interest amounting to £32,046, has been paid off this prosperous undertaking during the past twenty years. It appears that certain objections were raised before the Auditor by Mr. Ambrose Hall, J.P.; one being to the payment of interest on overdrafts to the bank—such interest not appearing in any book subject to audit, but being paid out of a suspense account. The existence of this account has for years been referred to in the Auditor's report; but the account itself has not been shown in the certified abstracts. Mr. Hall's objection raised an important point as to the legality of paying interest on overdrafts out of an account which hitherto the Auditor did not consider came regularly under his control, as it had not been included in the balance-sheet. It was contended before the Inspector, in answer to Mr. Hall's objection, that, the nucleus of this fund having been formed by grants of interest from the bank when there were credit balances, when there were debit balances the fund could be legally charged with the interest thereon; and, further, that the allowances made by the bank were voluntary, and could be applied in any way for the benefit of the gas undertaking. The Inspector inquired fully into the matter, and found that no reserve fund, as provided for by the Limerick Gas Act of 1878, had ever been set apart. Consequently, when it became absolutely necessary to expend a large sum on renewals about three years ago, there was no fund available, and arrangements were made by the late Manager (Mr. Spillane) with the National Bank to advance such an amount, not exceeding £5000, as might be necessary to carry out the works—interest to be paid at the rate of 4 per cent.; but this rate was subsequently reduced to 3½ per cent. The Inspector says: "In my opinion, the interest allowed by the bank should not have been lodged to a separate account, but should have gone to the credit of the revenue account in each year; and I decided that payment of interest on overdrafts out of the suspense account was an illegal expenditure. The borrowing powers of the Gas Committee are clearly defined by the

Corporation Gas Act of 1878; and in borrowing from the bank, as I have described, the Committee, in my opinion, acted illegally. The money to meet the claims of the bank for interest having been drawn by Mr. Riordan, the Gas Manager, from the Savings Bank, and lodged to the credit of the interest account in the National Bank, I have surcharged him with the sum of £77 8s., thus illegally dealt with."

THE POSSIBILITIES OF MOND GAS.

A Report on the Scheme by Mr. Valon.

By request of the Wolverhampton Corporation (who were petitioners against the Mond Gas Bill in the House of Commons), Mr. W. A. M'Intosh Valon prepared an exhaustive report on the possibilities of supplying the gas commercially in the extensive district which the Company are anxious to make their own in the Midlands.

After describing the plant employed in manufacturing the gas, and giving some particulars as to its constitution and the advantages claimed by the owners of the patents in respect to its production and distribution, Mr. Valon proceeds: The advantage of Mond gas, as of any producer gas, compared with coal gas, is simply that of low cost of production. In every other particular, it is far inferior to coal gas. In a works of large size, with a correspondingly great demand for power, it might pay to use producer gas made on the premises; there being practically no cost for distribution, or establishment charges. When, however, it is sought to manufacture producer gas in a separate works, and distribute it throughout a district, it is a very different matter. It will then be necessary, in addition to meeting the cost of manufacture, to provide for the expenses of distribution, administration, and a reasonable profit to the shareholders.

The capital outlay for mains and distributory apparatus will be very heavy. In the case of a coal-gas works, one-third of the total capital is expended under this head; and as the thermal value of producer gas is so much less than that of coal gas, a correspondingly larger quantity must be used to obtain equal power. The capital expended on distributory apparatus will therefore be so much greater. Indeed, mains to convey the same power will require to be four times the capacity.

The distribution charges in an ordinary gas-works—including interest on mains at 4 per cent.—amount to more than 4d. per 1000 cubic feet sold; and as the cost of distributing 1000 cubic feet of Mond gas must be practically the same, it is difficult to see how it will be possible to supply gas at 3d. and 4d. per 1000 cubic feet, especially as, in addition to the above charges, there must be added the cost of manufacture, management, and establishment charges generally, as well as the interest on capital outlay for works, land, &c.

As to the supply of Mond gas in competition with coal gas: (1) It is extremely problematical if Mond gas can be supplied at the price named. (2) It has not yet been proved that gas-engines are more economical in cost for power than steam-engines; and it is not probable that firms who are at present using steam for power purposes will scrap their existing engines and boilers, and incur a large outlay for gas-engines which are far more expensive in first cost. Even in the case of those who are using coal gas for power, it is more than doubtful if it would pay them to change, as the existing engines would not give nearly the same power with a gas of low value such as Mond gas, and the service-pipes to supply these engines would need to be four times the area of those now existing.

The Bill states that nothing in the nature of a monopoly is intended to be created; so that there is nothing to prevent another company seeking power to supply fuel gas in the same area, if it so desires, although it is very well known that Parliament declines, as a rule, to give statutory sanction to a scheme which will compete with other schemes doing the same work. Indeed, the disclaiming monopoly in the Bill is not very much. The only monopoly which an ordinary coal-gas company possesses is the power to break open the roads against the will of the local authority; and if Parliament so pleases that power may be given to two companies in the same area, when it would cease to be a monopoly. In this sense, the Mond Company would be a monopoly.

After carefully considering the whole question, I am of the opinion that the attempt to obtain statutory powers to supply fuel gas is premature. It has not been shown that, compared with other motive powers, producer gas when distributed from one centre is economical. Indeed, it is very questionable whether, when made on the premises, it compares favourably with steam and other sources of power. There are no grounds for supposing that Mond gas is particularly well suited for fuel purposes. It is very improbable that it will be possible to sell the gas at anything like the figure of 3d. or 4d. per 1000 cubic feet. The large size of the mains necessary for distribution will undoubtedly cause considerable interference with the existing gas and water mains and electric cables. I do not consider the Mond Company would be strong competitors with the Gas Company for motor purposes. The Mond Company do not undertake to supply a less quantity than a million cubic feet per quarter. It is extremely problematical if Mond gas can be supplied at the price named; and in the case of those who are using coal gas for power, it is more than doubtful if it would pay them to change. The existing engines would not give nearly the same power with a gas of low value, such as Mond gas; and the service mains and pipes to supply these engines would need to be larger in diameter.

The sole advantage that Mond gas possesses over coal gas is simply that of the low cost of production. In every other particular it is far inferior to coal gas. The thermal value is only about one-fourth—consisting, as it does, of a large proportion of inert gases; and while it is of lower quality, it costs the same to distribute per 1000 cubic feet. The pipes necessary for the supply of Mond gas will be of unusual dimensions, and will probably operate as a serious interference with the streets. As already stated, the low value of the Mond gas will make it necessary to lay larger mains than are required for coal gas; and it has been suggested that this difficulty may be got over by using a higher pressure. But experience has shown that this is hardly to be realized. In any case, there is no more difficulty in supplying coal gas at a high pressure than there is Mond gas.

THE PUBLIC LIGHTING OF CALCUTTA.

Cost the Obstacle to the Adoption of Electric Lighting.

It is generally supposed that the electric light has a better chance of success in hot climates than it has in this country; but from a discussion which took place at a recent meeting of the Calcutta Corporation, it is clear that its cost operates against it just as much abroad as at home.

The business before the meeting at the time the statement was made was the confirmation of a recommendation of the General Committee that the tender of the Oriental Gas Company for the lighting of the streets for ten years from May 1 be accepted. Mr. Elworthy sought to introduce a clause into the contract of a remarkable character. Its purport was that the Corporation should have the option, at any time during the ten years, to instal the electric light in any street or streets to the exclusion of gas, provided they guaranteed to pay for the minimum number of gas-lamps set forth in the contract throughout the period of ten years. He condescended to agree that, for narrow streets and roads, gas was the most suitable illuminant; but for wide streets and open spaces, he held that the electric light was the more desirable. Yet he proceeded: "Our experience in Calcutta in the matter of the Harrison Road has so far not been very favourable; but in this matter the electric light itself was not in fault." Mr. Elworthy, however, did not venture to explain where the fault was to be found.

The amendment was opposed, and most strongly, by Mr. Simmons, who stated that, under the contract with the Gas Company as it stood, it was open to the Corporation to do precisely what Mr. Elworthy sought the right to do; so that the amendment was quite unnecessary. The whole subject had been gone into thoroughly by a Sub-Committee; and it would be well if the public realized what electric lighting would cost Calcutta. The charge on aerial electrical mains being Rs. 295 per lamp per annum, and on underground electric mains Rs. 310 per annum, he would take an average of Rs. 302. There were 6621 gas-lamps in the city and suburbs, which cost at present about 3½ lakhs per annum. The same number if supplied with electricity would cost about 20 lakhs. If, as electricity was a better illuminant than gas, the number of lamps was reduced to 4000, it would cost about 12 lakhs, and if reduced to 3000 lamps it would cost about 9 lakhs. Nine lakhs as against 3½ lakhs meant a considerable increase in taxation—more than he would care to see imposed. The lighting of Harrison Road had been referred to, and was an illustration. There were 36 electric lamps in that road, which used to cost the Corporation Rs. 13,153 per annum. They were now charged Rs. 9750. The same number of gas-lamps would cost about Rs. 4000 per annum. In concluding his observations, he said the question of relative cost, which the public were prone to ignore, was precisely one that the Commissioners in the public interest could not overlook. If Mr. Elworthy's resolution was carried, and put into force, it must be remembered the Corporation would have to pay for both gas and electricity.

It was pointed out by the Chairman that the amendment was harmless, and had been accepted by the Manager of the Company. Under these circumstances, the members adopted it; but after the figures supplied by Mr. Simmons, they will scarcely be disposed to give effect to such a peculiar proposal.

ELECTRIC LIGHTING NOTES.

The electric light has been inaugurated at Weston-super-Mare. The installation has been put down by a Company; and, report says, they have already 95 customers on their books.

The Gas and Electricity Committee of the Rochdale Town Council have instructed the Town Clerk to apply for permission to borrow £23,000, the estimate of the sum required for boilers, dynamos, cables, &c., in connection with the electricity works.

A Sub-Committee of the Electric Light Committee of the Salford Corporation have recommended an increase in the price of current both for lighting and power purposes. The Engineer is looking into the matter, and will report at the next meeting of the Committee.

A Local Government Board inquiry has been held at Canterbury regarding an application by the Town Council for sanction to borrow £17,000 for electric lighting purposes. The money is required for new plant. A contract has been signed for the supply of the new Borough Asylum, and a large hotel requires current for a considerable number of lamps.

An additional sum of £20,000 is to be borrowed by the Taunton Corporation for the extension of the electric lighting works and plant. Part of the extension is necessary for the generation of electricity to work tramways in the borough. It was stated at the Local Government Board inquiry, however, that the present works are unequal to the demand for electricity for lighting purposes. The connections amount to 22,103 lamps; and there is a demand for an additional 1000, which cannot at present be supplied. The works at Taunton originally belonged to a Company. In 1893, when the Corporation took them over, there was a loss; and this was repeated in the three following years, until the loss amounted to £1729. Since 1898 the Corporation have been making a profit; and the total sum realized is £1954.

Mr. George Swainson, the Borough Treasurer of Bolton, has prepared an abstract of the accounts of the Corporation Electricity Department for the year ending March 31 last. It shows that the income was £24,103, and the total expenditure £13,549—yielding a gross profit of £10,554. Of this, £3815 goes for interest on mortgage debt, £5881 for depreciation and reserve fund, and £857 to the relief of the rates. Upwards of £12,400 of the income was derived from the sale of electricity by meter, £421 from rental of meters, £1113 from the sale of fittings, £10,100 from the sale of current to the Tramways Department, and £16 only from the rental of motors. As regards depreciation, 6 per cent. was written off machinery, mains, and transformers, and 10 per cent. off accumulators, meters, and electrical instruments.

A correspondent of the "Glasgow Herald" thinks many of the consumers of the electric light supplied by the Corporation must be griev-

ously disappointed at the new rate of charges proposed. He remarks that one class of business may benefit, but undoubtedly others suffer. Unfortunately, the writer belongs to the latter. He looks at the matter from the retail warehousemen's point of view. He says: "Suppose we have 200 lamps, 16-candle power divided into three sections—show windows, interior lights, and workroom lights—all supplied through one meter. Only for a few weeks in winter are these lamps all lit simultaneously. This short period fixes our maximum for the year, but during a great part of the year the workrooms may be closed before the window lights are turned on; consequently, the average would be about 150 lamps. But to reach the reduced rate, we must burn the 200 lamps for 365 hours or the equivalent, with the result that it is almost impossible to reach the lower figure, and so we pay 6d. per unit for nearly the whole current consumed. A neighbour with 20 lamps (inside only) uses these on an average of three hours per day per annum, and therefore pays 6d. per unit for one-third and 1d. per unit for two-thirds of the whole current used. Considering that 6d. per unit (250 volts) is equal to about 6s. per 1000 cubic feet for gas, the price does seem heavy." He concludes by expressing the opinion that no one would grumble at a fixed rate similar to the "domestic" 3½d.; and many would, he says, willingly pay it for business purposes. But at present the rates charged prevent anything like the popularizing of electricity as an illuminant.

Colonel W. R. Slacke, R.E., one of the Local Government Board Inspectors, recently visited Taunton to inquire into an application by the Corporation for permission to borrow £20,000 for the purposes of electric lighting. There was no opposition. In the course of the inquiry, the Town Clerk (Mr. G. H. Kite) stated that the application was divided into two parts—£3220 being in connection with the proposed tramways, and £16,780 for general extensions. The former was to purchase plant, but not to supply the trams with the necessary energy; the British Electric Traction Company having entered into an agreement with the Town Council by which they guaranteed to take a minimum of 60,000 units per annum for seven years, at 2d. per unit, whether the trams continued running for that time or not, which would amount to an annual payment to the Corporation of £500. In seven years, therefore, the Corporation would receive £3500, which was more than the amount required for the new plant. In support of the second portion of the proposed loan, the Town Clerk quoted some interesting figures showing the progress made by the electric light undertaking since it was taken over by the Corporation in 1893. In 1894 it was found that the first year's working had resulted in a loss of £925. This loss gradually decreased until in 1898 the balance-sheet revealed that there had been an actual profit on the year's working of £751. In 1899 there was a profit of £501; the falling off being due to a reduction in the charges, and in 1900 there was a profit of £706. During the first four years the Corporation had the works, they received from the rates £1775; and in the last three years they had contributed to the rates no less a sum than £1954, in addition to making several reductions in the charges. The cables laid measured altogether 47,600 yards, and the lamps connected numbered 22,103, besides which they had 1000 more on demand. The Town Clerk further pointed out that, unless permission was given to raise this additional loan, it would be impossible to meet the demand now being made for light and electric motive power. At the close of the inquiry, Colonel Slacke inspected the works.

EXTENSIONS AT THE WEST CHESHIRE WATER COMPANY'S WORKS.

A New Pumping-Station at Hooton.

Last Thursday week an important extension of the West Cheshire Water Company's resources by the opening of a new pumping-station at Hooton was inaugurated by the Chairman of the Company (Mr. John Holt).

Mr. Isaac Carr, M.Inst.C.E., of Widnes, the Company's Engineer, to whose plans the whole of the work has been carried out, supplies the following description of the new engines and pumps: The engine, which has been built by Messrs. Hathorn Davey and Co., of Leeds, is of the type known as their "high duty differential engine." It is a horizontal compound tandem engine, having 30-inch and 56-inch cylinders, and 5-feet stroke, working two sets of pumps. There are a pair of 17-inch diameter open light bucket pumps, each 5-feet stroke, in separate boreholes, from which the supply is drawn, with the suction 210 feet below the ground-level. These pumps, which are actuated by quadrant motions direct from the high-pressure cylinder, deliver the water into a sump or suction tank below the engine-room floor. From the tank, the water is forced into the distributing mains by means of a double-acting piston force pump, 17-inch diameter and 5-feet stroke. This pump is actuated direct from the piston-rod of the low-pressure cylinder. The steam-valves are controlled by Davey's differential gear, to which they are directly attached. A surface tubular condenser, of ample capacity, is provided; also an efficient boiler feed-water heater. Further features of the engine are that the steam before entering the cylinders passes through an efficient steam dryer, which extracts any particles of condensed steam that may form in the connecting pipe between the engine and boiler. Again, the steam, after leaving the high-pressure and before entering the low-pressure cylinder, is superheated by means of a copper coil in the connecting pipe. For the drawing and changing the buckets and clacks of the borehole pumps, and also for handling the borehole pump trees or rising mains, is a 15-ton steam-winch fixed on the girders between the quadrant motions. To facilitate this work, ample overhead room has been provided to admit of a clear lift of each length of pump-rod and main. For handling the rest of the machinery—the engine and force pump—is a 10-ton overhead travelling crane. All the foundations for both the machinery and building are of a very substantial character, and are composed entirely of concrete. The capacity of the engine, when running at a velocity of 150 feet per minute, is to lift 2,160,000 gallons per diem 600 feet high. The water is exceedingly pure in quality, and abundant in quantity—in fact, the quantity is very much in excess of the capacity of the pump. The boreholes are 450 feet and 500 feet respectively; the pump suctions are fixed 210 feet down; and notwithstanding the fact that continuous day and night pumping has been carried on over a period of six years, the present level of the water is only 90 feet below the surface of the ground, or 120 feet above the pump suctions. The building, which is specially designed to suit the requirements of the machinery, is of grey brick and red sandstone, with all door and window arches and cornices in best pressed terra-cotta bricks. The interior walls of the building are divided up into panels and faced with red pressed brick. This not only economizes material, but also relieves the somewhat bare and hard appearance of straight plain walls. The over-all dimensions of the building are 92 ft. long, 26 ft. 7 in. wide, and 46 ft. high above the ground-level. The foundations extend to a depth of 10 feet below the ground-level, one side of which is utilized as the force-pump suction tank. Steam is supplied from two steel Lancashire boilers 7 ft. 6 in. by 30 ft., with a working pressure of 100 lbs., or nominally 300-horse power each. There is duplicate pumping plant at this station, consisting of a compound horizontal rotative tandem engine with a capacity of 750,000 gallons per diem, and a total lift of 600 feet. The general arrangements of the duplicate plant are somewhat similar to those of the new engine. The pumping-station has siding communication with the railway, so that the coal waggons are brought up and discharged alongside the boilers. The work, which was commenced in February, 1899, has taken a little over two years to complete.

At the formal opening ceremony, the Chairman was presented with a handsome silver cup, as a memento of the interesting event in the history of the Company; and the Directors afterwards entertained those present to a dinner at the Hooton Hotel. During the after-proceedings, the Chairman alluded to the Company's difficulties in trying to do their duty towards the large body of consumers depending on them; remarking that the public did not always make sufficient allowance for their difficulties. The Company had laboured long and hard to overcome these difficulties; and it would be conceded that they had been fairly successful. In thinking over the question of the water supply of Wirral, it had often occurred to him what an advantage it would be if all the water undertakings in the whole district were one. This idea might not commend itself to everyone present; but he regarded it as something desirable from the consumers' point of view. Although the Company would themselves like to provide for Wallasey—believing that they had a sufficiency for the purpose—still, they did not view with jealousy the proposal to supply Vyrnwy water to the district named. At the same time, having obtained an Act of Parliament for a certain area, and having spent a large sum on the undertaking, they must endeavour to take care that Liverpool, in supplying Wallasey, should not be in a position to provide for the West Cheshire Company's customers. There would not, he believed, be any necessity for doing so, because with the pumps the Company had now connected they were quite capable of meeting all the wants of their district satisfactorily. When formed in 1884, the Company secured an Act to supply thirty-nine townships in Wirral; and in 1894 they obtained Provisional Orders for ten other townships. Their present area of supply was 42,000 acres, which was equal to 67 square miles, or an area six times as large as that supplied by the Birkenhead Corporation; twice as large as that of Bradford, Leeds, or Hull; and more than half the size of all the districts administered to by the Liverpool Corporation. The interests of the old Wirral Company were bought out in 1885 by the West Cheshire Company in the district of Lower Bebington; and the Company began by supplying a population of 4500. Since then an average of 1300 consumers a year had been added, until the present population depending upon them was estimated at 25,000. Then, mains had been laid into every township in Wirral excepting three. To two of these they were now laying mains; and they were quite ready to undertake the third when desired. The total length of mains laid since 1885 was 100 miles; and they had expended on their operations close on £80,000. The capacity of supply by the new pumping machinery at Hooton was 2,160,000 gallons per day. The water from the new wells had been analyzed by a London authority, whose certificate was: "It is a water of a very high degree of organic purity. The hardness is temporary and removable by boiling." Should the population increase at the same rate as in the past, the Company calculated that they had made provision for the next 25 or 30 years.

NIDD (BRADFORD) WATER SCHEME.

Arbitration as to Land.

To assess the price to be given by the Corporation of Bradford for an estate in the Valley of the Nidd, a Court of Arbitration—consisting of the Under-Sheriff of Yorkshire (Mr. E. Gray) and a Jury—was held last Friday at Harrogate. For their great water scheme in the valley, the Bradford Corporation have already acquired a large quantity of the necessary land; and the estate now sought to be purchased comprises a little over 68 acres, including Pry House Farm. It is situate four miles above Middlesmoor, and belongs to a Mr. and Miss Verity. For the owners, one witness put the value at £2407, made up of £973 for the farm purchase money, £400 for shooting rights, £816 for special value (being £12 per acre), and £218 for compulsory purchase, reckoned at the rate of 10 per cent. Another witness valued the property at £2473. Mr. James Watson said he considered £10 an acre—making a total of £690—would be a full price for the property. Already 2388 acres had been taken over; and in view of the prices paid for this vast extent of land, £10 an acre would, in his opinion, be a better price than had been given for any other. There was no special adaptability in the present instance; and it would in all probability be 30 years before the Corporation would require the reservoir which it was proposed to build on the site in question, as it would be the last which need be constructed in connection with the scheme. Mr. Charles Gott put the value at £819. The Under-Sheriff said, to his mind, the question of special adaptability was not one for which great compensation should be made. The Jury, after a long deliberation, assessed the total amount to be paid by the Corporation at £1326 12s. 6d., and estimated the value of the portion upon which interest was to be paid at £2 per acre per annum, which at 28 years' purchase made a capital value of £56 an acre.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The report of the Finance and Law Committee of the Edinburgh and Leith Gas Commissioners to the meeting held this week, stated that for the period from May 16, 1900, to May 8 of this year the total collections amounted to £315,690. There were still six days of the financial year to run; but, as compared with the collections during the entire financial year ending at Whitsunday, 1900, there has been a large increase of revenue; the total sum then having been £297,225. The price of gas was advanced 4d. per 1000 cubic feet in October last; but it is evident that, although this increase may have checked the advancing consumption of gas, it has not had any further effect. The report of the Engineer (Mr. W. R. Herring), submitted to the Commissioners, showed an increase in the make of gas during April, as compared with the same month of last year, of 3,170,000 cubic feet; and for the period from May 16 till the end of April, an increase of 34,223,000 cubic feet over the corresponding period. The Works Committee reported that they had resolved to visit the International Exhibition in Glasgow about this time, to inspect the systems of gas lighting in use there; but the Convener (Mr. D. Purves) stated that the visit had been postponed, the reasons for which were that the nights would be longer than they are just now, and that the appliances would have had several months' trial. The Treasurer (Mr. J. S. Gibb) reported that he had received the £200,000 which the Commission had borrowed from the Corporation of Edinburgh. Bailie Manclark, of Leith, said the Finance Committee were authorized to borrow on mortgage a further £50,000, and they had received tenders for £52,300. They would require probably another £100,000, though not just now; but this being a favourable offer, he moved that they accept the tenders for the £2300 extra. This was agreed to; Mr. Purves remarking that the Money Market was rather against the Commissioners at present, and that they intended to borrow only as required. The Finance Committee reported the redemption of £90 18s. 4d. of annuities of the Commissioners, at the price of £2611 6s. 6d. This is at the rate of 28⅝ years' purchase. It is slightly higher than the statutory price—28½ years' purchase; but the Commissioners cannot exercise their statutory right of redemption till 1908.

The Newport (Fife) Town Council met this week to resume consideration of the resolution previously agreed to, that they adopt the Burghs Supply (Scotland) Acts. The Clerk, however, reported that he had received no reply from the Gas Company to the offer which was made them to purchase the undertaking at the price of £10,072. Several members expressed the view that the Council were being trifled with. On the motion of Provost Thomson, the Clerk was instructed to write to the Clerk to the Company asking for a definite reply by June 20; and the meeting was adjourned till July 1.

The Town Council of Falkirk have had a sort of field night over a subject which is far from being settled, either in law or in practice—the treatment of tenders. The line has yet to be laid down where the duty of the manager ends, and that of his employers begins. In this instance, after the tenders for coal had been received and opened by the Works Committee, they were handed to the Gas Manager (Mr. J. Kincaid) to tabulate. Then, it appears, Mr. Kincaid telegraphed to three of the tenderers, asking if they could not reduce the quotations. The result was that reductions were intimated to the amount of £50. At a meeting of the Works Committee subsequently, this application of Mr. Kincaid to the offerers was resented; and the Committee resolved to recommend that the coal supply should be re-advertised for. When this recommendation came before the Town Council, there was a long discussion upon it; and the views expressed, I must admit, were nearly all in the way of condemnation of what had been done. The Council resolved to advertise again. So long as the practice varies so much, it would serve no good purpose to devote more attention to the Manager's action; but I think it is open to remark that the Council made far too much of the incident. There seemed to be too much virtuous indignation over what did not need to ruffle the municipal calm for a single moment. If they were convinced that the Manager was wrong, their remedy was a very simple one. There was no need for them to excite themselves, or to incur the cost of advertising again; all that was necessary was that they should ignore the matter altogether, and settle their contracts upon the original tenders. The fact that there was so much ado, seems to indicate that the councillors were making "a display of force" for some diplomatic purpose; and that had the purpose been wanting, there would have been no such display. The subject is one which might be discussed calmly, in the abstract, at a Gas Association meeting, with a view to an understanding upon it, if not a settlement of the practice, on lines that would satisfy everybody.

I do not know that many will be surprised at the announcement, regrettable though it is, which I give in the words in which it appeared in a newspaper last Saturday. Under the heading of Kilsyth, it was stated that "as is customary, the Committee went to the works on the 15th to take stock, in the course of which they and the Manager fell out; and the latter, forgetting the injunctions set forth in Proverbs, to the effect that 'He that is slow to wrath is of great understanding,' and that 'He that restraineth his lips is wise,' opened on them with a torrent of abuse, and with, it was stated, a selection of choice language, quite unfit to be set forth in this, a family newspaper. On the recommendation of the Committee, the meeting agreed to ask the Manager to send in his resignation in eight days; failing which he would be dismissed." This was the outcome of a meeting of the Town Council. It is now announced that Mr. W. Hamilton, the Manager, has sent in his resignation, to take effect at the end of three months. By that time Mr. Hamilton will have completed 25 years of service as Manager in Kilsyth—first under the Gas Company, and latterly under the Gas Commissioners. The opening remark of this paragraph has reference to the fact that Mr. Hamilton is unfortunately possessed of an excitable temperament. How pitiful it is that this failing should have such a result as the putting of a check upon his career.

The Directors of the Bothwell and Uddingston Gas Company state

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1498.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 12	10½	Alliance & Dublin 10 p.c.	19—20	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	Jan. 2	5	Australian 5 p.c. Deb.	102—104	..	4 16 2
200,000	5	May 15	6⅔	Bombay, Ltd.	6—6⅞	..	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4¾—4⅞	..	5 9 5
380,000	Stk.	Feb. 14	12	Brentford Consolidated	260—265	..	4 10 7
270,000	,,	,,	9	Do. New	187—192	..	4 13 9
50,000	,,	,,	5	Do. 5 p.c. Pref.	128—132	..	3 15 9
159,375	,,	Dec. 13	4	Do. 4 p.c. Deb.	113—116	..	3 9 0
220,000	Stk.	Mar. 14	10	Brighton & Hove Orig.	222—227	..	4 8 1
226,320	,,	,,	7	Do. A. Ord. Stk.	160—165	..	4 4 10
1,022,500	Stk.	Feb. 27	5	Bristol, 5 p.c. max.	119—121	..	4 2 8
420,000	20	Mar. 28	10	British	41—42	..	4 15 3
50,000	10	Feb. 28	12	Bromley, Ord. 10 p.c.	24—26	..	4 12 4
79,000	10	,,	9	Do. 7 p.c.	19—21	..	4 5 8
500,000	10	May 31	6	Buenos Ayres (New) Ltd.	8½—9½*	..	6 6 4
220,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	97—100	..	4 0 0
150,000	20	Mar. 14	8¼	Cagliari, Ltd.	22—24	..	6 17 6
100,000	10	May 31	10	Cape Town & Dis., Ltd.	14½—15¼*	..	6 9 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	51—53	..	5 13 2
550,000	Stk.	Apl. 12	12	Commercial Old Stock	275—280	..	4 5 9
236,425	,,	,,	9	Do. New do.	205—210	..	4 5 9
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	May 31	9	Continental Union, Ltd.	160—165*	..	5 9 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	160—165*	..	4 4 10
575,000	Stk.	Feb. 28	5	Crystal Palace Ord. 5 p.c.	120—125	..	4 0 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	..	3 16 11
486,930	10	Jan. 31	11	European, Ltd.	20—21	..	5 4 9
354,050	10	,,	11	Do. £7 10s. paid	14½—15½	..	5 6 5
15,079,885	Stk.	Feb. 14	4 4/10	Gas-light and Coke — 4 p.c. Ord.	94—96	..	4 11 8
2,600,000	,,	,,	3½	Gas-light and Coke — 3½ p.c. max.	90—92	..	3 16 1
3,799,735	,,	,,	4	Gas-light and Coke — 4 p.c. Con. Pref.	108—111	—1	3 12 1
4,067,125	,,	Dec. 13	3	Gas-light and Coke — 3 p.c. Con. Deb.	93—95	..	3 3 2
70,000	10	May 31	8	Hongkong & China, Ltd.	13—14*	..	5 14 4
3,800,000	Stk.	May 15	10	Imperial Continental	210—215	..	4 13 0
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Feb. 28	10	Liverpool United A	234—236	..	4 4 9
678,100	,,	,,	7	Do. do. B	172—176	..	3 19 7
366,083	,,	Dec. 28	4	Do. do. Deb. Stk.	120—122	..	3 5 7
75,000	5	Dec. 13	4†	Malta & Medn., Ltd.	4⅜—5¼	..	5 14 3
500,000	100	Apl. 1	5	Met. of — 5 p.c. Deb.	104—107	..	4 13 5
250,000	100	,,	4½	Melbourne — 4½ p.c. Deb.	102—104	..	4 6 6
541,620	20	May 31	3½	Monte Video, Ltd.	9—10*	..	7 0 0
717,946	Stk.	Feb. 22	8½	Newc'tle & G'tesh'd Con.	230—231	+3	3 13 7
312,855	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.	99—101	..	3 9 4
150,000	5	May 15	8	Oriental, Ltd.	6⅞—7¼	..	5 10 4
135,000	5	,,	8	Do. New, £4 10s. pd.	5½—6	..	6 0 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1⅜	..	4 11 5
					*Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Feb. 28	7	Ottoman, Ltd.	5¾—6¼	..	5 12 0
851,070	10	Apl. 26	7	River Plate Ord.	10¾—11¼	..	6 4 5
250,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
250,000	10	Mar. 28	8	San Paulo, Ltd.	11—12	..	6 13 4
135,000	Stk.	Mar. 14	10	Sheffield A	235—240	..	4 3 4
209,984	,,	,,	10	Do. B	234—236	..	4 4 9
523,498	,,	,,	10	Do. C	232—234	—2	4 5 6
5,761,885	Stk.	Feb. 14	5	South Met., 4 p.c. Ord.	126—129	..	3 17 6
1,547,965	,,	Jan. 16	3	Do. 3 p.c. Deb.	93—96	..	3 2 6
380,940	Stk.	May 15	5	Southampton Ord.	106—111	..	4 10 1
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
120,000	Stk.	Feb. 28	6	Tottenham and — A. 5 p.c.	115—120	..	5 0 0
250,520	,,	,,	4½	Tottenham and — B. 3½ p.c.	85—90	..	5 0 0
80,100	,,	Dec. 13	4	Edmonton — 4 p.c. Deb.	109—114	..	3 10 2
182,380	10	Jan. 16	5	Tuscan, Ltd.	8—9	..	5 11 1
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—102	..	4 18 0
230,000	5	Feb. 28	9	West Ham, 10 p.c.	9—10	..	4 10 0
147,000	10	,,	6	Do. 7 p.c.	11½—12½	..	4 16 0
128,984	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
				WATER COMPANIES.			
780,499	Stk.	Dec. 28	11	Chelsea, Ord.	292—297	..	3 14 1
150,000	,,	,,	5	Do. 5 p.c. Pref.	155—160	..	3 2 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	138—143	..	3 2 11
175,785	,,	Mar. 28	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
1,720,560	Stk.	Apl. 12	7	East London, Ord.	188—193	..	3 12 6
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	145—150	..	3 0 0
980,169	,,	,,	3	Do. 3 p.c. Deb.	95—97	..	3 2 6
700,000	50	Dec. 13	8	Grand Junction — 10 p.c. max.	105—108	..	3 14 1
310,000	Stk.	Mar. 28	4	Grand Junction — 4 p.c. Deb.	123—127	..	3 3 0
708,000	Stk.	Feb. 14	14	Kent	298—303	..	4 12 5
160,000	,,	,,	7	Do. New, 7 p.c. max.	200—205	..	3 8 4
1,043,800	100	Dec. 28	10½	Lambeth, 10 p.c. max.	270—280	..	3 15 0
406,200	100	,,	8	Do. 7½ p.c. max.	207—212	..	3 15 5
350,000	Stk.	Mar. 28	4	Do. 4 p.c. Deb.	123—126	..	3 3 6
500,000	100	Feb. 14	13⅓	New River, New Shares	405—410	..	3 7 1
1,000,000	Stk.	Jan. 31	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
902,300	Stk.	Dec. 13	7	South-wark and Ord.	188—193	..	3 12 6
126,500	100	,,	7	South-wark and — 7½ p.c. max.	177—182	..	3 16 11
489,200	Stk.	,,	5	South-wark and — 5 p.c. Pref.	153—158	..	3 3 3
1,019,585	,,	Apl. 12	4	Vauxhall — 4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	Dec. 13	10	West Middlesex	265—270	..	3 14 1
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
200,000	,,	Mar. 14	3	Do. 3 p.c. Deb.	96—98	..	3 1 3
					*Ex. div.		

† Next dividend will be at this rate.

that the balance at the credit of the revenue account of the Company for the year ending April 30 is £2999. They propose to pay a dividend at the rate of £10 per cent., to add £500 to the reserve fund, making it £5330, to write off £506 for depreciation, and to carry forward £1075. During the year, 45,200,000 cubic feet of gas were made, and 43,895,000 feet accounted for. The sale of gas was 1,920,000 cubic feet more than the preceding year. The Company possess a workmen's compensation accident fund, amounting to £1091, which is an unusual provision among companies. Coal cost £4016, lime £130, repairs, maintenance, and stores £1034, and carriage and cartage £444. There was received for coke £3584, and for tar £770. Mr. L. Hislop, the Manager, has every reason to be gratified with the year's working.

The Town Council of Cowdenbeath held a special meeting on Tuesday, to consider the subject of the lighting of the burgh. The Town Clerk had, by request of the Council, written to the Gas Company asking for confirmation, or otherwise, of a report to the effect that the Company were about to erect new works; and, if so, when they expected to be able to supply gas. The reply of the Company was to the effect that the report was quite correct, and that the plans of the proposed works were almost ready to be submitted to the Town Council. The Company further stated that they would be able to supply gas by Nov. 15, or earlier, and that it would be supplied for public use on very reasonable terms, a statement as to which would be submitted to the Council later on. The Council resolved to consult their Law Agent upon the question of whether this action on the part of the Company would have the effect of preventing the Council from erecting gas or electric lighting works for the burgh.

The Gas Committee of the Elgin Town Council this week submitted a report by the Manager (Mr. J. Kay) as to the coal supply for the ensuing year. Mr. Kay reported that all grades of coal showed a reduction over last year's prices, and that, after the most careful consideration of the tenders, he had made up a selection that would cost, on an average, 23s. 7d. per ton delivered at the works. This was a reduction of 3s. 7d. per ton upon the price paid during the present year. It was resolved to accept the tenders recommended. Plans and estimates by Mr. Kay of new condensers and washer-scrubber were also submitted; the estimated cost being £600. It was explained that what was now proposed was part of a general scheme of extensions which was adopted by the Town Council some years ago, but which had been allowed to stand over until the carbonizing plant had been dealt with. It was now imperative, because of the increased output of gas, and of the worn-out and inadequate condition of the plant, to proceed with the work at once. The Council agreed to have the work done.

The Town Council of Aberdeen met this day week, and appointed Mr. Charles Hawksley to examine and report to them as to the best sources from whence to derive an addition to the city water supply, and the probable cost. Mr. Hawksley is at present engaged in the work. He left Aberdeen yesterday to spend several days in inspecting the upper waters of the Dee and the Avon, the latter of which is a tributary of the River Spey. It is the latter which is the favourite, as it is a water of great purity, gathered in the uninhabited mountain region between Ben Macdhui and Ben Avon, and is almost free from mossy taint. The water would most probably be taken from the river at a height of about 1600 feet above the city; and the whole pipe-track could be laid without resort to tunnelling.

The Edinburgh and District Water Trustees met yesterday to consider a report by a Sub-Committee of the Works Committee upon the Provisional Order which the Trust are promoting. The object of the Order is to extend the time for completion of the Talla water-works from 1905 to 1908, the postponement of the sinking fund for a like period, and the giving of powers to borrow a further sum of £200,000. Some difficulty, it appeared, had been raised in the department of the Secretary for Scotland about the proposal to postpone the formation of a sinking fund. It had, however, been overcome; and the arrangement had been come to, which the Trust were asked to approve of, that five years after the Talla water is introduced into the city the Trustees shall set aside annually a sum of £2000, to be, at the expiry of other five years, increased to £4000 annually, for the formation of a sinking fund for the extinction of the annuities granted to the Water Company in 1870. The Trustees ratified the arrangement. It was explained that the effect of it would be that seventeen years hence the domestic water-rate will have to be increased by ½d. per pound.

CURRENT SALES OF GAS PRODUCTS.

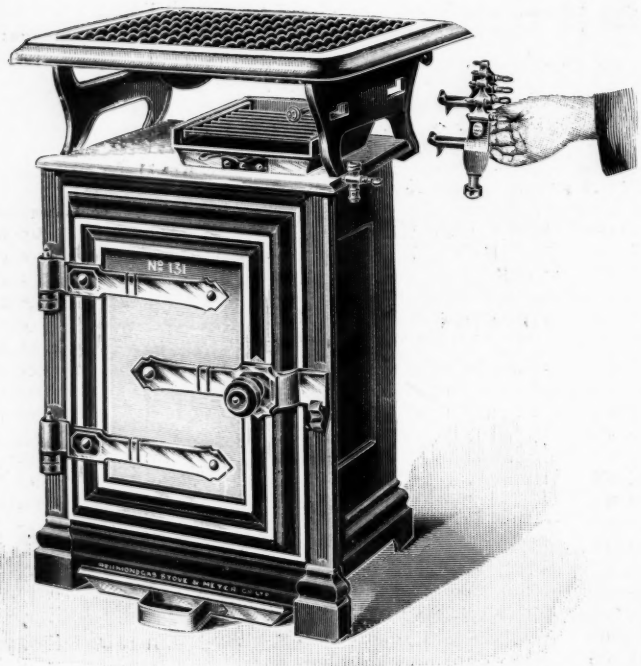
LIVERPOOL, *June* 1.

Sulphate of Ammonia.—The business of the week has been rather of a holiday character, and values have declined somewhat; the closing quotations being £10 11s. 3d. per ton f.o.b. Hull, £10 15s. f.o.b. Leith, and £10 17s. 6d. f.o.b. Liverpool. Buyers have become indifferent; and although supplies have not been very abundant, parcels offered have had to be disposed of at a decline. In the forward position, makers' quotations remain at £11 per ton; but buyers have withdrawn, and orders are no longer obtainable at the price.

Nitrate of Soda is firm in all positions; and spot quotations are 8s. 7½d. and 8s. 10½d. per cwt., for ordinary and refined qualities, respectively.

LONDON, *June* 1.

Tar Products.—Benzol is rather quiet, especially as regards prompt delivery, for which there is very little demand. There are still inquiries for forward delivery, but business does not result; makers not being anxious to sell. Carbolic is quiet; but crude is in very good demand for June-July delivery. For tar oils there is still a very good inquiry; and prices have an upward tendency. Solvent continues quiet, although several contracts are reported to have been passed for home consumption. As regards pitch, there is little or no demand for prompt; but a large business is reported forward—principally, however, in London makes. There is really no business doing in anthracene; and the price may be considered as nominal. It is probable that



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negotiations will soon be opened for delivery next year; but it is clear consumers will only buy the best quality of high percentage.

The average values obtaining during the week are: Tar, 14s. 6d. to 17s. 6d. Pitch, east coast, 29s.; west coast, 27s. Benzol, 90's, 8d. to 10d.; 50's, 8d. to 9d. Toluol, 11d. to 11½d. Crude naphtha, 4d. Solvent naphtha, 1s. Heavy naphtha, 11½d. to 1s. 1d. Creosote, 1½d. Heavy oils, 2¼d. Carbolic acid, 60's, 2s. 5d. Naphthalene, 70s. to 75s.; salts, 40s. to 50s. Anthracene, "A," 2½d.

Sulphate of Ammonia.—The market remains in about the same position; and there is really very little business doing—shipments being restricted owing to the holidays. The demand for Liverpool is scarcely so good, and slightly lower prices have been accepted for forward delivery. The official price of Beckton is still £11 in any position; but sales are reported on Beckton terms at £10 12s. 6d. There is very little doing at Hull. Sales have been made at £10 11s. 3d. prompt; but makers ask £10 12s. 6d. for June, and decline to sell forward. As regards Leith, there is very little business to report. Evidently some quantity is being offered by dealers, and it does not find a ready sale.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The expectations of reduced prices referred to last week have been realized—although perhaps not to the full extent that was anticipated. The first move was made by the leading collieries in the neighbourhood of Manchester, who, on Tuesday last, decided to reduce their pit, wharf, and delivered rates for house coal by 1s. 8d. per ton on the better qualities, and 10d. on common sorts; and although, owing to the holidays, it has been impossible to ascertain precisely what action will be taken by the Coal Sales Association representing other Lancashire collieries, it is regarded as extremely probable that a similar reduction will be made generally in this district. Business during the past week has been very limited in weight; and pits are only just getting into operation again after the holiday stoppages. House-coal business is falling off considerably, as could only be expected under existing weather conditions. Average pit-rates can scarcely be given until the general extent of the reduction is definitely known. Steam and forge coals are in slow request, and prices are with difficulty maintained at about 10s. 6d. to 11s. 6d. per ton at the pit. The lower qualities of slack are in very limited demand; but for the better sorts there is more inquiry. Lancashire prices range from about 6s. 6d. and 7s. per ton at the pit for common, to 8s. and 8s. 6d. for better sorts. Shipping is quiet, with prices weak; steam coal averaging 11s. 6d. to 11s. 9d. per ton delivered at the Mersey ports.

Northern Coal Trade.—There has been a larger demand for coal since the holidays; and there is now a return to a normal rate of production, so that with a large number of steamers ready for cargo shipments have been heavy. For best Northumbrian steam coals, the price is quoted as about 13s. per ton f.o.b.; and there is a good demand, more especially on contracts. For steam smalls, the demand is less, and the price is weaker; from 5s. 6d. to 5s. 9d. per ton being now quoted. In the gas coal trade, there is a steady inquiry; but it is most noticeable for export, the demand for home consumption being very nearly at the lowest point of the year. The price quoted for best Durham gas coals is about 10s. per ton f.o.b. for occasional cargoes; but for coal for contracts ahead 9s. per ton f.o.b. has been taken for large quantities, and other contracts now in course of negotiation seem likely to be closed at about the same rate. Best Durham coke is quoted at from 17s. 6d. to 18s. per ton f.o.b.; while for blast-furnace coke the quotation is from 14s. to 15s. 6d. at the Teesside furnaces. Gas coke is in limited production; and the price quoted locally is from 12s. to 13s. per ton f.o.b.

Scotch Coal Trade.—Trade has not been good. The most satisfactory feature of it is that it is the home trade which is improving; but the improvement is being checked by the uncertainty as to the result of the remit to the Conciliation Board upon the wages question. Buyers expect lower prices, and are holding back orders for forward delivery. It is expected that the decision of Lord James of Hereford, the Arbitrator, will be issued soon after the case is presented to him, which is to be in a few days. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. 6d. to 11s. 6d., and splint 10s. 6d. to 10s. 9d. The shipments for the week amounted to 224,769 tons—an increase of 8184 tons upon the previous week, and of 8148 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,558,506 tons—a decrease of 562,991 tons upon the same period of the previous year.

Reported Explosion at the Cork Gas-Works.—As we were going to press last evening, the following telegraphic message was received in London: "This afternoon a terrible explosion occurred at the Cork Gas-Works, the principal gas holder, which contained nearly half-a-million feet of gas, 'exploding' with a tremendous report. As soon as the first shock was over, it was discovered that four men had been badly injured The local fire brigade were promptly on the scene; and all the gas-mains were cut off. The fire is still raging. The city will probably be without gas to-night."

The Strike at the Cork Gas-Works.—The position of the dispute between the Cork Gas Company and their old workmen has not changed. The management, however, has been able to improve the supply until it is again equal to the demands, and as the supply improved, so the hope of the strikers of getting their own way must have correspondingly fallen. Mr. M'Grath, the Company's Manager, has obtained additional men to come to his help from other parts of Ireland; but the works are still closely guarded by policemen. The strikers on Saturday had an interview with the Directors, and offered to return on the old terms, provided the men who filled their places were dismissed. The Directors naturally refused to accede to these terms. No decision has yet been given in the actions brought against some of the men for leaving work without notice. Judgment should have been delivered last Thursday; but unfortunately on that day, the Bench was not constituted as on the day of hearing, and so the matter was postponed.

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BLACKBURN	1,250,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Cont.)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN	1,000,000

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Malmesbury Water-Works Transfer.—As the result of an arbitration as to the price to be paid, the Malmesbury Water-Works are to be transferred to the Corporation for the sum of £6540.

St. Ives (Cornwall) Gas Supply.—From the report presented by the Gas Committee as to the working of the department for the year ending March 31 last, it appears that only 768 tons of coal were carbonized, showing a decrease of 170 tons compared with the previous year. The quantity of gas made was 7,393,270 cubic feet, or a decrease of 335,630 cubic feet, which may be accounted for by a reduction in the amount of leakage, brought about by a systematic overhauling of the mains during the last six months—that is, soon after the appointment of the present Manager (Mr. W. Hearson). The leakage, however, is still as much as 16·9 per cent. of the make, which is a decrease of 4 per cent. compared with the previous year. The gas made per ton of coal carbonized was 9617 cubic feet, as against 8122 feet; and the amount accounted for was 7991 cubic feet per ton, compared with 6452 feet. The gross profit on the undertaking was only £67 10s. 7d., which was more than absorbed by the payment of principal and interest; but "taking everything into consideration, the Committee are of opinion that the year's working has not been unsatisfactory."

Water Divining at Teignmouth.—To ascertain whether the watershed under Haldon Hills abounds in water sufficient to supply Teignmouth, two members of the District Council appealed to townspeople for subscriptions; and as a result, a water diviner was engaged, and he went over the ground. About 20 ratepayers were present, including Colonel Morrison, the Chairman of the District Council, and Mr. C. Jones, the Surveyor. The requirements of the town are 200,000 gallons per day; and the present supply is about 120,000 gallons. The first point tested was at Whitewell, rather more than 750 feet above sea level and on the Venn Estate. The diviner estimated that there would be an average total yield of 40,000 gallons per 24 hours in the driest time of the year if a trench were cut to gather the whole of the water and run it into the Whitewell stream. A move was then made to a field on the same estate, about half-a-mile lower down, and towards the red sandstone formation. This field was, according to the tests, full of water, at depths varying from 20 to 25 feet. It was estimated that a supply of 30,000 to 40,000 gallons of water could be obtained. This field being in almost a straight line with the Whitewell, the diviner judged that at least 70,000 gallons could be procured from the two sources in the dry season. Proceeding to the New Road, a test was made in a field, and new hazel twigs cut from the hedge turned at a spot at which the diviner said there were at least 40,000 gallons of water passing; and a few yards beyond, another yield of 70,000 gallons, which he would guarantee at a depth of 200 feet. This was the strongest spring he had indicated; but the level would necessitate pumping to supply the high districts, which cost it was intended to avoid, if possible. A test at Broadmeadow located a spring giving 90,000 gallons of water per 24 hours. Persons who accompanied the diviner were satisfied that there is water in the neighbourhood, which if not obtained by gravitation, can be secured by pumping.

Carmarthen Water-Works Loan.—For the completion of their new water-works, near Conwil, the Carmarthen Corporation have found it necessary to apply for an additional £15,000. The previous loan amounted to £25,000. An inquiry was held on Thursday into the matter by Mr. W. A. Ducat, of the Local Government Board. He was informed by the Engineer (Mr. J. H. Barnes) that the capacity of the new reservoir would be 16¼ million gallons, and that, after calculating evaporation, the rainfall in the area acquired would yield 367½ million gallons a year. The application was not opposed.

Irish Trades Congress and Water Gas.—At last Wednesday's sitting of the Irish Trades Congress at Sligo, the following resolution was passed: "That as water gas is admittedly much more poisonous, and thus more dangerous to the public health, than coal gas, and as there is much less attention given to the plumbing work in the houses of the working classes than in those of the well-to-do, be it resolved that the Parliamentary Committee be instructed to take the requisite steps to have the proportion of water gas in relation to coal gas kept within such bounds that the public safety may be secured by compelling public authorities to so enforce the Public Health Acts as to prevent the vendors of such commodity supplying anything which has been proved and certified to be deleterious to the health of the community."

Cockermouth Gas Supply.—At the last monthly meeting of the Cockermouth Urban District Council, the minutes presented by the Gas Committee set forth that the Gas Manager (Mr. Harold Baker) had submitted his annual report, which had been approved and adopted. From the balance-sheet it appeared that, after paying £545 interest, and providing £381 for the reduction of debt, the working balance had been reduced by £279—viz., from £1738 to £1459. The fact that the balance now stood at this amount was due to the substantial rise in the revenue from gas; the increase in the quantity sold being 1,851,600 cubic feet. The policy adopted two years ago of reducing the price had been fully justified, as revealed by the fact that 47 new consumers had been added during the year. The Committee considered the application of the Manager for an increase of salary, and they recommended that it be raised by £20 per annum. Mr. Stephenson moved the confirmation of the minutes. They had, he said, really had a good year, especially in view of the fact that they had paid £492 more for coal. The results may be briefly summarized as follows: Capital borrowed, £21,300; amount paid off, £3520; present debt, £17,780; working balance, £1548; reserve funds, £850. Since the Council acquired the undertaking, the price of gas had been reduced from 4s. 2d. to 3s. 3d. per 1000 cubic feet, and meter-rents had been abolished; while considerable sums had been expended on plant. The results would be satisfactory to the ratepayers, and great credit was due to their predecessors who had the pioneer work to do. It was a wise policy to sell gas at the lowest possible price; for in that way the ratepayers reaped the direct benefits. As to the Manager's salary, Mr. Baker, since he was appointed in 1896, had achieved results which spoke for themselves. They must do something to encourage him. Mr. Rook seconded the motion; and it was carried unanimously.

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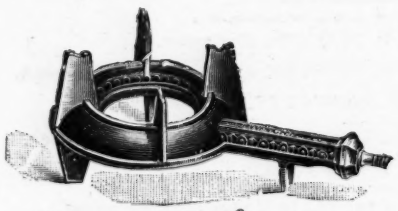

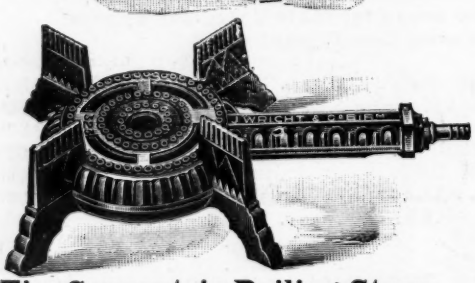

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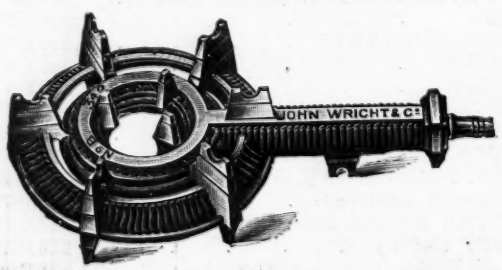

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BIRMINGHAM, LONDON, MANCHESTER, LIVERPOOL, & BRISTOL.

Coventry Gas Affairs.—In a report by the Gas Committee, the Coventry City Council have the following information: The gas made during the year ended March 31 last was 559,690,000 cubic feet, which was an increase of 3,720,000 cubic feet on the previous year, or 0·67 per cent. The number of consumers on March 31 was 8929—an increase of 605. The number of stoves on hire was 3328—an increase of 681. The mains were increased by 2 miles 79 yards—making 60 miles 562 yards.

The Advance in Prices at Manchester.—The *agenda* for the meeting to-morrow of the Manchester City Council contains the following resolution, passed by the Gas Committee: "That, in obedience to the instructions of the Council, as set forth in their resolution of the 1st of May, 1901, the price of gas be advanced to consumers by ordinary meters (including public lamps) as and from the 24th of June, 1901, by 3d. per 1000 cubic feet, both in and beyond the city (*i.e.*, from 2s. 6d. to 2s. 9d., and 2s. 9d. to 3s. per 1000 cubic feet respectively)."

Dearne Valley Water Provisional Order.—The Board of Trade have granted a Provisional Order to the Dearne Valley Water Company authorizing them to raise £23,000 additional ordinary capital. Of this sum, £3000 is to be issued "to the holders of the existing share capital 'A,' ratably according to their respective holdings in respect of profits which have been expended upon extensions and improvements of the undertaking." The remaining £20,000 is to be raised by shares of £10 nominal value, which are to be offered for sale by auction or tender. The dividend payable on this new capital is limited to 6 per cent., except as to the £3000 above mentioned, upon which the Order places a maximum dividend of 5 per cent. In the event of the profits being insufficient to pay the full amounts of the prescribed rates of dividend, a proportionate reduction "shall be made in the dividends payable on each class." Upon this additional capital the Company are empowered to create debenture stock to the extent of £4750. Clause 22 enacts that, as from April 1, 1903, the water supplied by the Company shall be constantly laid on under pressure.

North Middlesex Gas Company's New Show-Room.—It cannot be expected, when a gas-works is situated a long way from any part of the supply district, that the consumers will put themselves to the trouble of making a journey to the gas-works to see what there is in the way of new gas appliances or to obtain advice; and thus it is good policy to bring both the appliances and the means of obtaining counsel to the consumers. The North Middlesex Gas Company have therefore done well to open a show-room and offices at Finchley, and to engage Miss Ball to conduct free cookery classes there every afternoon for a few weeks—the stoves used being those of Messrs. Arden Hill and Co. (John Wright and Eagle Range, Limited). The Gas Company have announced a reduction of 3d. per 1000 cubic feet from the meter reading for the current quarter—making a reduction of 5d. since the beginning of the year. They have also decided to connect stoves direct with the meters at a maximum charge of 12s. 6d.—and less where the work can be done at a smaller cost. The Company's venture appears to be attracting considerable attention in the district; and it is to be hoped that it will be encouraged by success.

Plumbers' Wages in Sheffield.—Mr. Blashill, the Arbitrator in the long-standing dispute between the Sheffield master plumbers and their workmen, has made known his decision, which is in favour of the maintenance of the wage of 9d. per hour which was paid before the strike. It may be remembered that last December the men ceased work because the employers would not advance the rate of payment from 9d. to 9½d. per hour. In March they agreed to a consideration of the question of the dispute by the National Conciliation Board, which is composed of masters and operatives; but no wages settlement was arrived at. The men, however, consented to arbitration, undertaking to resume work on the 1st of April at the old rate of wages, pending the result. This is against them.

Ripon's Cheap Water Supply.—In our "Gleanings" from the Parliamentary Committee-rooms, we recently stated that the application of the Ripon Corporation to Parliament for power to carry out a scheme of water supply from the River Laver had ended in a compromise with Leeds and Harrogate (who had also Bills before Parliament), whereby one or other of the latter had agreed to supply Ripon with water at 4d. per 1000 gallons; the maximum supply being 200,000 gallons per day. At the meeting of the Ripon Council last Thursday, it was stated that the original price suggested for the water was 6d. per 1000 gallons, which would, on the full quantity, have meant £1725 per annum; whereas on the terms secured, the total for a year's supply would be £1150. At present Ripon is receiving in water charges about 8d. per 1000 gallons. They may be congratulated both on the price at which the water is to be supplied, and on the fact that they have gained two strings for their bow.

Staffordshire Potteries Water-Works Company.—The report submitted at the annual meeting of the Company on Wednesday last, stated that the revenue for the year amounted to £49,196, or an increase of £1812 over the previous year. There was a profit balance of £23,900, which, with the balance brought forward, and an amount of £800 transferred from the contingent fund account, made a total of £25,692. In moving the adoption of the report, the Chairman (Mr. James Maddock) said the past year had been an exceptional one, for the Company had had to face an increased cost on almost every article they used. Since the last meeting, they had added to the pumping capacity at Hatton, by which they would obtain a million gallons of water every 24 hours. This work had been carried out at a cost of about £1300. Looking at the year's working as a whole, it was a source of considerable gratification to the Directors to be able to present such a satisfactory report. The motion was agreed to; and it was decided to pay dividends at the rate of 8 per cent. per annum (making, with the interim distribution, 8½ per cent. for the year) on the ordinary stock, and of 7 per cent. per annum on the new ordinary stock. An extraordinary meeting of the Company was subsequently held, at which the Directors were authorized to raise £4380 by the issue of 3½ per cent. perpetual debenture stock. The Chairman explained that there was no immediate intention to spend the whole of this sum; but the Board thought it probable that before the next annual meeting they would require some of it for extensions.

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Tar-Distilling Plants. Claus' Sulphur-Recovery Plants

SULPHATE OF AMMONIA PLANTS.

Messrs. Rentell's address should have been given in last week's issue as Exeter (not Essex) Street, Strand, W.C.

Messrs. R. & A. Main, Limited, have received an order to supply one of their large gas-roasters to the Royal Household at Sandringham.

Messrs. Biggs, Wall, and Co. have received orders for the installation of their "Rapid" charging-machines in the following gas-works: Normanton two machines, Sherborne one, Whittington one, Warminster one, and Shrewsbury four.

Messrs. Fletcher, Russell, and Co., Limited, have been exhibiting at Henley, with lectures by Miss Rose Brown; and the Davis Gas-Stove Company at Lewes. The Walker and Wallsend Gas Company have had an exhibition at Willington Quay, with Miss Wells as the cookery demonstrator.

Mr. Alfred Richards will shortly offer for sale by auction a sufficient number of £10 "E" 5 per cent. preference shares in the Aldershot Gas and Water Company to produce £4204 12s. 4d. His task, we are sure, will not be a difficult one; the Company's position having recently been assured by their victory in Parliament.

The Heckmondwike Gas Company have recently placed with Messrs. R. Dempster and Sons, Limited, of Elland, a contract for one of their patent hot-coke conveyors, complete with storage hoppers and coke-storing plant, to work in conjunction with the installation of inclined retorts being erected at gas-works by the same firm.

The East London Water-Works Company are inviting tenders for an issue of £150,000 of 3 per cent. debenture stock. The stock is redeemable at par after the expiration of 25 years from the date of issue, subject to six months' notice being given by the Company. The conditions attaching to the sale will be found in an advertisement appearing elsewhere in this number of the "Journal."

Messrs. W. C. Holmes and Co. have received orders for their patent "New" scrubber-washers for erection at the Colne (Lancs.), Londonderry, Darvel (N.B.), and Ballina Gas-Works. The firm are carrying out the work in connection with the extension of the purifier-house roof and the condensers at the Ilkeston Gas-Works; and they have been entrusted by the Masham Gas Company with an order for a new gasholder, &c.

Referring to a paragraph on p. 1340 of the "Journal" for the 14th ult., Glenfield and Kennedy, Limited, of Kilmarnock, write to point out that for the past twelve years or so they have been making instruments which comply with the requirements mentioned—to enable a water-works manager to see at a glance the level of water in a reservoir and have a continuous record of the level as it may be at any time of the day or night. The firm send a list of their electric water-level recorders as supplied to various water-works at home and abroad—some 47 in all (including repeat orders); and they mention that in one case, the transmitter at the reservoir actuates a combined indicator and recorder in the engineer's office, as well as a simple indicator at the pumping-station.

Mr. J. Barton, of Peterborough, who has been asked by the proprietors of the Kingscliffe Gas-Works to advise them, recommends the acquisition of a new retort-bench, consisting of six retorts, a new set of condensers, and a new scrubber, to replace worn-out apparatus. The total cost of the work will be about £500. The present plant was erected forty or fifty years ago by Mr. George Bower, of St. Neots; but unfortunately it has been allowed to get into a very bad state.

In connection with the interesting account in last week's issue of the methods adopted by the New Orleans Lighting Company (under the direction of Mr. Frederick H. Shelton) in pushing their business, Mr. E. W. T. Richmond calls our attention to a letter he has received from Mr. Shelton, dated May 14, in which he shows that the new policy has created a "boom" in gas-stoves. He writes: "That the way we advertise on this side brings results, is shown by the fact that we have booked orders for 1128 ranges in ten days."

R. Laidlaw and Son, Limited, was registered at Edinburgh last week as a private Company, to acquire the goodwill and the whole real, heritable, and personal property of the firm of R. Laidlaw and Son, of the Alliance Foundry, Broomhill Iron-Works, and Lambhill Foundry, Glasgow, and the works in Simon Square, Edinburgh, and to carry on the work of gas and water engineers, contractors, manufacturers, &c. The capital is £110,000, divided into 5500 of 3 per cent. preference shares of £10 each, and 5500 ordinary shares of £10 each.

Owing to the wars in China and at the Cape having paralyzed the railway operations in those markets, and also to the high price of coal in England, the business of the Lamp Manufacturing Company, Limited, has suffered temporary depression. The net profits for the past year amount to £264. This sum added to the balance brought forward, and after making further provision for bad debts, leaves £1806 standing to the credit of the profit and loss account. The Directors feel justified in recommending the payment of the full dividend (7 per cent.) upon the preference shares, less income-tax, which will leave £1174 to be carried forward. As, however, the money representing the whole of these profits is actually employed in the business, the Directors consider it would be advantageous if it were retained. It is proposed to raise £1500 of new capital by issuing ordinary shares.

There has been an interesting gas exhibition at the Town Hall, Aylesbury. It was promoted by the Gas Company and the Davis Gas-Stove Company; and its attractiveness was greatly enhanced by the personal exertions of the Engineer of the former (Mr. George Lane). The principal exhibits were the "Diamond" gas cooking-stoves. A very effective display was also made with patent pendants for use with incandescent burners; and a model of a slot meter under a glass case, by Messrs. Thomas Glover and Co., was also a feature of interest. In proportion to its size, it is believed there are more slot meters in use in Aylesbury than in any other town in England. Each afternoon and evening, Miss M. E. Betts gave cookery demonstrations. Mr. Lane and his assistants (Messrs. A. G. Lane and H. Hoy) were frequent in their attendance to welcome visitors, and explain to them the advantages of cooking by gas.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

TERMS OF SUBSCRIPTION to the "JOURNAL."

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance. If credit is taken, the charge is 25s. a year.

Telegraphic Address: "GASKING, LONDON."
Telephone Number: Holborn 121.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, Palmerston Buildings,
Old Broad Street,
London, E.C.

Andrew Stephenson, Agent. All communications re Oxide to the Company as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

Andrew Stephenson,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

BROTHERTON & CO.

Offices: Commercial Buildings, Leeds. Correspondence invited.

R. B. FITZ-MAURICE, 4, East India Avenue, London. Foreign and Colonial SHIPMENTS and CHARTERING promptly attended to FIRE, LIFE, and ALL CLASSES of INSURANCES effected on the Lowest Terms.

SULPHATE OF AMMONIA

SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 Bolton," or Telegraph "Saturators, Bolton."

Largest Practice and most Up-to-Date Works in Britain.

Joseph Taylor and Co., Central Plumbing Works, Victoria Square, Bolton.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, Oldham; and 45 & 47, Westminster Bridge Road, London, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

Read Holliday and Sons, Ltd., Huddersfield.

GAS TAR wanted.

Brotherton and Co., Tar Distillers.
Works: Birmingham, Leeds, and Wakefield.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

SULPHURIC ACID for Sale.

Brotherton and Co., Chemical Manufacturers.
Works: Birmingham, Leeds, and Wakefield.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

19, Farringdon Road, London, E.C.
Telegrams: "Luminosity."

OXIDE OF IRON OF FINEST QUALITY.

BALE'S Special Fire Cement should be used to keep Retorts, Furnaces, &c., in good repair during the heavy Winter Work.

Send for full Particulars to
Bale & Co., 120 & 121, Newgate Street, London, E.C.
Telegrams: "Bogore, London."
Telephone "277 Holborn."

PATENTS FOR INVENTIONS.

Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.

Information and Handbook on application.
70, Chancery Lane, London, W.C.

AMMONIACAL LIQUOR wanted.

Brotherton and Co., Ammonia Distillers.
Works: Birmingham, Leeds, and Wakefield.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

TO GAS AND WATER OFFICIALS.

HIGH-CLASS CYCLES at Reasonable and LOW PRICES. Guaranteed and sent on approval. For Cash or Gradual Payments. Catalogue post free. Old Machines Exchanged or Repaired.

Melrose Cycle Company, Coventry.

PRACTICAL RETORT SETTERS.

GEORGE NUTTALL & CO., 32, Have- lock Road, Saltley, Birmingham.

Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

STOKER and Handy Man wanted for Small Country Gas-Works. An Unmarried Man and a Teetotaler preferred.
Apply, stating Age and Wages required, with References, to ALFRED E. ASHLEY, Gas-Works, Neston, CHESHIRE.

WANTED, a good Gas-Fitter, for the Midlands, to fit up Houses on the Prepayment System (Iron or Compo.).
Apply, by letter, stating Age, Experience, and Wages required, to No. 3702, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a Gas-Works in the Midlands, a competent MAIN and SERVICE LAYER.
Apply, by letter, stating Age, Experience, and Wages required, to No. 3703, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TWO or Three Draughtsmen required who have gone through the Shops. Those having experience in Structural Work in Gas-Works will be given preference.
Apply to the NEW CONVEYOR COMPANY, LIMITED, Smethwick, BIRMINGHAM.

GAS-STOVE TRADE.

FIRST-CLASS Representative Wanted.
Able to organize and develop business. Must be fully qualified and experienced.
Apply, by letter, to No. 3700, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Clerk, with a knowledge of Rental Accounts, Shorthand, and Typewriting, for the General Office of a Suburban Gas Company. Commencing Wages, 30s. per week.
Apply, by letter, to No. 3701, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, two steady, reliable Men as STOKERS. Must be good Shovel Chargers, and used to Engine and Exhauster. Wages, 35s. per week of seven days, with a Week's Holiday every Year.
Apply to S. BARK, Manager, Gas-Works, SUNBURY-ON-THAMES.

FITTERS WANTED.

TWELVE Additional Fitters required, used to Compo. and Barrel work. Must be quick and neat. Only good Men need apply. Give References and Wages required.
RICHMOND GAS STOVE AND METER COMPANY, LIMITED, Carpenter's Road, STRATFORD, E.

MECHANIC and Blacksmith wanted, willing to make himself generally useful on the Works. Applicants must have had experience in an Engineer's Workshop.
State previous Employment, Age, Wages required, and enclosing *copies* of Testimonials, to A. E. LAYTON, Manager, Gas-Works, REDDITCH.

JUNIOR wanted at the Yeovil Gas- Works. Qualified to keep Books and assist Manager.
Applications, with Particulars as to Age, Experience, Salary, &c., to be addressed to the Chairman.
EDWARD HOWELL,
Manager.

GAS-WORKS MANAGER AND ENGINEER.

THE Aldershot Gas and Water Company require a MANAGER of WORKS. Must be a competent Gas Manager, able to design and carry out New Works, and have fair Chemical Knowledge.
State Age, if Married, present Position, and whether accustomed to the manufacture of Sulphate of Ammonia and working of Generator Furnaces.
Salary £350 per annum, with Residence.
Address application (with Testimonials), to the Secretary.
Applications to be received not later than noon, Wednesday, June 12, 1901.
R. W. EDWARDS,
Secretary.
Head Office: 103, Victoria Road,
Aldershot.

TO GAS MANAGERS.

THE Tipton Urban District Council re- quire the services of a competent and experienced MANAGER to take charge of their Gas-Works. The present Annual Make of Gas is 99 Million Cubic Feet.
He will be required to reside in the Parish, and to devote the whole of his time to the service of the Council.
He must be able to design and carry out all Extensions, and have had experience in all Departments.
Salary £170 per annum.
Applications—stating Age (which must not exceed 45), present Position, Experience, and Training, accompanied by *copies* of not more than three recent Testimonials, and endorsed "Gas Manager"—must be sent to the undersigned not later than the 8th of June next.
Canvassing the Members directly or indirectly will be considered a disqualification.
By order,
JNO. W. WARING,
Clerk to the Council.
Public Offices, Tipton,
May 29, 1901.

DRAUGHTSMAN.

WANTED, temporarily, a Draughts- man, with thorough experience of Mechanical and Architectural Gas-Works Plans, Estimates, and Quantities.
Apply, stating Age, Wages, and Experience, to No. 3699, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Working Manager for a small Gas-Works in Nottinghamshire. Annual make 1 Million. Can be considerably increased.
Applicants must have some knowledge of Gas-Fitting, and be able to develop the Business, set Retorts, lay Mains and Services, fix Meters and Stoves, and do all Ordinary Repairs.
Apply, stating Age, Wages, &c., to No. 3698, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COUNTY BOROUGH OF WARRINGTON.
(GAS DEPARTMENT.)

WANTED, a Retort-House Foreman, experienced with West's Manual Machines, Regenerative Furnaces, and the control of Workmen. Wages 45s. per week.
For further Particulars, apply to Mr. W. S. Haddock, Engineer.
FREDK. TAYLOR,
Secretary.
Offices: Mersey Street,
Warrington, May 23, 1901.

THE Sutton, Southcoates, and Drypool Gas Company, Hull, invite applications for the position of RESIDENT MANAGER. Annual make of Gas 180 million cubic feet. House, Coal, and Gas free.
State Age and Salary.
Applications, enclosing three Testimonials (only), to be sent to the Chairman not later than the 25th of June, 1901.
By order of the Board,
DAVID WOOD,
Secretary.
Offices: St. Mark's Street, Hull,
May 31, 1901.

WANTED, a Gas-Works on Lease or Purchase, by thoroughly practical Gas Engineer.
Address No. 3665, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SECOND-HAND Tank to hold 300 to 400 Tons of TAR wanted.
Full Particulars and Price to be sent to JOSIAH HARDMAN, LIMITED, Milton, STAFFS.

TO BE SOLD—
SINGLE GASHOLDER, 22 ft. by 10. ft. Four Columns.
Write J. WRIGHT, Bridge House, BLACKFRIARS, E.C.

BEDFORD GASLIGHT COMPANY.

FOR SALE—Two Exhausters made to pass 15,000 cubic feet per hour "Beale's Patent" with or without Engines (Two) by Tangyes, Overhead Shafting, &c., 9-inch Inlet and Outlet Valves.
Apply to the ENGINEER, Gas-Works, BEDFORD.

FOR SALE—One Second-hand Gasholder in good condition, 40 ft. diameter by 14 ft. deep, with Five Cast-Iron Columns and Lattice Girders. This can be offered either erected in Brick Tank to be built to my Drawings, or supplied complete with Steel Tank and fixed ready for work.
For Price and Particulars, apply to
JOHN ANDREWS.
Gas-Works, Langley Mill.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY Gas Engineer, Thornhill, DEWSBURY.

FOR IMMEDIATE SALE.

OWING to the Introduction of Elec- tricity for the Public Lighting, the Sleaford Gas Company, Limited, have FOR SALE, 137 LAMP COLUMNS, BRACKETS, and COPPER LANTERNS. Many of the Lanterns are practically new, fitted with No. 4 Kern Burners, Auto-Taps, and Anti-Vibrators. Also One Large LAMP COLUMN, fitted with Arc Lamp and Three No. 4 Kern Burners, complete.
For Photos, Prices, &c., apply to H. WIMHURST, Engineer and Manager, Gas-Works, SLEAFORD.

THE Corporation of the City of Bangor are prepared to receive TENDERS for the GAS COAL required at their Gas-Works during the ensuing Year, in such quantities and at such times as may be required (in all 4000 Tons) from the 1st of September, 1901, to the 31st of August, 1902.
The person whose tender is accepted will be required to enter into an Agreement with the Council for the due performance of his contract.
The lowest or any Tender not necessarily accepted. The Council also reserve the right to divide the contract between two or more Contractors.
Further Information and Forms on which the Tenders must be made may be obtained on application to the undersigned.
Sealed Tenders, addressed to the Chairman of the Lighting Committee, must be delivered on or before the 20th of June.
JOHN SMITH,
Manager.
Gas-Works, Bangor,
June 1, 1901.

COUNTY BOROUGH OF OLDHAM.

THE Oldham Corporation Gas-Works Committee are prepared to receive TENDERS for the supply of about 124,000 Tons of COAL and CANNEL required by them during the Year ending the 30th of June, 1902.
Specification and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, the 18th of June.
A. NICHOLSON,
Town Clerk.
Oldham, May 24, 1901.

COUNTY BOROUGH OF OLDHAM.

THE Gas-Works Committee invite TENDERS for the TAR and AMMONIACAL LIQUOR to be produced at their different Gas Stations, for a period of One Year, commencing the 1st of July next.
The Yearly make of Tar is about 8000 Tons and of Ammoniacal Liquor about 2,500,000 gallons.
Particulars and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, June 18, 1901.
A. NICHOLSON,
Town Clerk.
Oldham, May 20, 1901.

THE Urban District Council of Hindley are prepared to receive TENDERS for the supply of GAS COAL, CANNEL, ENGINE SLACK, and LIME, required at their Gas-Works during the ensuing Twelve Months.
Full Particulars, with Form of Tender, can be obtained on application to Mr. William Dickinson, Gas and Water Manager.
Sealed Tenders, endorsed "Tender for Gas Coal, &c.," to be lodged with the undersigned not later than Monday, June 17, 1901.
By order,
STEPHEN HOLT,
Clerk to the Council.
Offices: Cross Street,
Hindley, May 28, 1901.

CONGLETON CORPORATION.

TAR AND LIQUOR.

THE Gas Committee are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR, to be produced at their Gas-Works for One Year ending the 30th of June, 1902.
Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, to be delivered at the Town Clerk's Office, Congleton, not later than Monday, the 17th of June current.
Further Particulars may be obtained from the undersigned,
WM. ORME,
Engineer and Manager.
Gas-Works, Congleton,
May 24, 1901.

CHELTENHAM GASLIGHT AND COKE COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Cheltenham Gas- light and Coke Company invite TENDERS for the supply of COAL for a period of Twelve Months from the 1st of July next.
Particulars may be obtained from the undersigned, to whom Tenders, endorsed "Tender for Coal," must be delivered on or before Thursday, the 20th inst.
The lowest or any Tender will not necessarily be accepted.
R. O. PATERSON,
Engineer and General Manager.
Gas-Works, Cheltenham,
June 1, 1901.

SHEFFIELD UNITED GASLIGHT COMPANY.

TO ENGINEERS AND IRONFOUNDERS.

THE Directors of the above Company invite TENDERS for the Supply and Erection at their Neepsend Works of a CANNEL BREAKER and ELEVATOR, with Conveyor, Engine, Hoppers, &c., complete.
Drawings may be seen, and Specification with Form of Tender obtained, on and after Thursday, May 23, from the Engineer, Mr. J. W. Morrison, at the Company's Offices, Commercial Street.
The Directors do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed "Tender for Cannel Breaker," must be delivered (by post) to the undersigned not later than the first post on Thursday, June 6, 1901.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
May 17, 1901.

CORPORATION OF DROITWICH.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the supply of 1800 Tons of best screened GAS COAL or NUTS, between July 1, 1901, and June 30, 1902, to be delivered at Droitwich (G.W.Rly.), in such quantities as may be required.
Forms of Tender and any other Particulars may be obtained on application to the Manager, Mr. S. G. Askew.
The Committee reserve the right to accept Tenders for the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed "Tender for Gas Coal," to be sent to the undersigned not later than June 8, 1901.
S. J. TOMBS,
Town Clerk.
Town Hall, Droitwich,
May 21, 1901.

THE Urban District Council of Atherton invite TENDERS on or before Wednesday, June 12 inst., for the supply during Twelve Months from the 1st of July next, of 6000 Tons of screened GAS COAL or NUTS.

Forms of Tender and further Information may be had on application to

WM. GARNETT,
Deputy Clerk.

Town Hall, Atherton,
June 1, 1901.

BUXTON URBAN DISTRICT COUNCIL.

TENDERS FOR CANNEL.

THE Gas Committee invite Tenders for the supply of 3500 Tons of CANNEL, to be delivered at their Siding (on the Midland Railway) in Ashwood Dale, Buxton, during the Year ending the 30th of June, 1902.

Forms of Tender and other Particulars may be obtained of Mr. H. Barker, Engineer, Town Hall, Buxton.

Sealed Tenders, endorsed "Tenders for Cannel," to be addressed to the Chairman of the Gas Committee, and delivered not later than Saturday, June 15.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
JOSIAH TAYLOR,
Clerk.

May 30, 1901.

BUXTON URBAN DISTRICT COUNCIL.

TENDERS FOR TAR AND LIQUOR.

THE Gas Committee invite Tenders for the purchase of the surplus TAR and LIQUOR produced at their Works in Ashwood Dale, Buxton, for One Year commencing from the 30th of June next.

Forms of Tender and other Particulars may be obtained of Mr. H. Barker, Engineer, Town Hall, Buxton.

Sealed Tenders, endorsed "Tenders for Tar and Liquor," to be addressed to the Chairman of the Gas Committee, and delivered not later than Saturday, June 15.

The Committee do not bind themselves to accept the highest or any Tender.

By order,
JOSIAH TAYLOR,
Clerk.

May 30, 1901.

LINCOLN CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Gas Committee of the Lincoln Corporation invite TENDERS for the supply of 26,000 Tons of screened GAS COALS and NUTS, to be delivered during a period commencing the 1st of July, 1901, and terminating the 30th of June, 1902.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 15th of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

JNO. CARTER,
Manager.

Gas Offices, Lincoln,
May 30, 1901.

LINCOLN CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR TAR.

THE Gas Committee of the Corporation of Lincoln are prepared to receive TENDERS for the purchase of the surplus TAR (about 1200 Tons) produced at their Works during the period of One Year commencing on the 1st of July, 1901.

Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Residuals," must be delivered at the Gas Offices, Lincoln, on or before the 15th of June next.

The Committee do not bind themselves to accept the highest or any Tender.

Other Particulars may be obtained of the undersigned.

JNO. CARTER,
Manager.

Gas Offices, Lincoln,
May 30, 1901.

COUNTY BOROUGH OF BURY.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of
40,000 Tons of GAS COAL,
600 Tons of BURGY,
300 Tons of HOUSE COAL.

Forms of Tender and Conditions of Contract may be obtained on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

Tenders, endorsed "Gas Coal," to be addressed to the Chairman of the Gas Committee, Town Clerk's Office, Bury, and delivered not later than Saturday, the 15th of June next.

The Gas Committee invite TENDERS for the supply and delivery of a TANK LOCOMOTIVE, Standard Gauge.

Further Particulars as to Size, &c., may be had upon application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Bury.

The Gas Committee further invite TENDERS for the supply and delivery of a SECOND-HAND LOCOMOTIVE.

Tenders, endorsed "Locomotive," to be addressed to the Chairman of the Gas Committee, Town Clerk's Office, Bury, and delivered not later than Saturday, the 15th of June next.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bank Street,
Bury, May 28, 1901.

THE INCORPORATED

Gas Institute.

THE THIRTY-EIGHTH

ANNUAL GENERAL MEETING

OF THE MEMBERS

WILL BE HELD ON

TUESDAY (10.30 a.m.)
WEDNESDAY (10 a.m.), and
THURSDAY (10 a.m.),
the 11th, 12th, and 13th of June, 1901,

AT THE

ROYAL UNITED SERVICE INSTITUTION,

WHITEHALL, LONDON.

THE CHAIR WILL BE TAKEN BY THE PRESIDENT,

T. ORMISTON PATERSON, Esq.,
M. Inst. C.E.

On Friday, June 14, there will be an EXCURSION by Steamer to HERNE BAY.

THE BENEVOLENT FUND.

The Annual General Meeting of the Donors and Subscribers to the Benevolent Fund will be held on Tuesday, June 11, at the close of the sitting, about Two p.m.

WALTER T. DUNN, Secretary.

13, *Victoria Street, Westminster, S.W.*

THE Newtown and Llanllwchaiarn Urban District Council are prepared to receive TENDERS for the supply of COAL required at their Gas-Works during One, Two, or Three Years from the 1st of July next.

Tenders, endorsed "Coal," to be delivered not later than noon on Monday, June 17, 1901.

Particulars and Forms of Tender on application to Mr. W. A. M. Valon (Consulting Engineer), 140 and 141, Temple Chambers, Temple Avenue, London, E.C., or to

MARTIN WOOSNAM,
Clerk to the Council.

Council Offices, Newtown,
North Wales, June 25, 1901.

CORPORATION OF LANCASTER.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of screened GAS COAL, to be delivered on the Gas-Works Siding, Lancaster, in such quantities and at such times as may be required, during a period of One Year, commencing delivery July 1 next.

Sealed Tenders, endorsed "Gas Coal," giving full Particulars of the Coal offered, must be delivered to T. Cann Hughes, Esq., Town Clerk, Lancaster, on or before June 15 next; any further Information and Forms of Tender may be obtained on application to the undersigned.

C. ARMITAGE,
Manager.

Gas-Works, Lancaster,
June 1, 1901.

URBAN DISTRICT COUNCIL OF PONTYPRIDD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the following:—

CONTRACT No. 5 — IRONWORK for RETORT-BENCH EXTENSION.
" " IRONWORK for EXISTING BENCHES.

The Drawings may be seen, and copies of Specification and Form of Tender obtained, on application to the Gas Engineer, Mr. Edward Jones, Gas Offices, Treforest, on payment of One Guinea, returnable on receipt of *bonâ-fide* Tender.

Sealed Tenders, endorsed "Contract No. 5 Retort Ironwork," to be sent to the undersigned not later than Tuesday morning, June 18, 1901.

C. SYDNEY WATSON,
Clerk to the Council.

Council Chambers, Pontypridd,
May 31, 1901.

TENDERS FOR COAL.

THE Directors of the Isle of Thanet Gas Company are desirous of receiving TENDERS for the supply of good DURHAM GAS COAL, for One, Two, or Three Years (Second and Third Years at the option of the Company), to be delivered into the Company's Works at Margate; the quantities being as follows: First Year, 26,000 Tons; Second Year, 28,000 Tons; Third Year, 30,000 Tons.

Sealed Tenders, endorsed "Tender for Coal," to be addressed to the Chairman, and to be sent in not later than Thursday, June 13, 1901.

Forms of Tender can be had on application; and any further Particulars will be supplied by the Company's Engineer, Mr. James Dougall.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
THOS. C. FULLER,
Secretary.

Company's Offices, The Dane,
Margate, May 17, 1901.

WELLINGBOROUGH GASLIGHT COMPANY, LIMITED.

TENDERS FOR COAL.

THE Directors of the above Company invite TENDERS for the supply of best screened GAS COAL and NUTS for One Year commencing the 1st of July next.

Tenders, endorsed "Coal," to be addressed to the undersigned, and delivered not later than June 10.

The Directors do not bind themselves to accept the lowest or any Tender.

S. H. KIMBELL,
Secretary.

STOCKTON-ON-TEES CORPORATION.

TENDERS FOR GAS COAL.

THE Gas and Electricity Committee of the above Corporation invite TENDERS for the supply, in whole or in part, of 30,000 Tons of GAS COAL, for delivery in weekly quantities as may be required by the Gas Manager.

Tenders, sealed and endorsed "Tenders for Gas Coal," to be sent in not later than noon of the 22nd day of June, 1901, addressed to the undersigned, at the Gas-Works.

The Gas and Electricity Committee do not bind themselves to accept the lowest or any Tender.

WM. FORD,
Manager.

CANNOCK, HEDNESFORD, AND DISTRICT GAS COMPANY, LIMITED.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 3000 Tons of best Screened GAS COAL during the ensuing Year.

Further Information and Forms of Tender may be obtained on application to the undersigned.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman, to be sent in not later than Monday, June 10, 1901.

The Directors do not bind themselves to accept the lowest or any Tender.

T. A. NICHOLLS,
Secretary.

Gas-Works, Cannock.

SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gaslight Company, invite TENDERS for the supply of about 16,500 Tons of screened GAS COALS, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during the Year, commencing July 1, 1901, and ending June 30, 1902.

The Directors reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Tenders must be made on Forms (containing further Particulars) which may be obtained on application at the Company's Works, or by post, and must be sent to the undersigned, on or before the 15th day of June, 1901.

By order,
WM. BELTON, Assoc.M.Inst.C.E.,
Engineer, Secretary, and Manager.

Gas-Works, Shrewsbury,
May 7, 1901.

SKIPTON URBAN DISTRICT COUNCIL.

TO COLLIERY PROPRIETORS, COAL MERCHANTS, AND OTHERS.

THE Council invite Tenders for the supply of about 7000 Tons of best screened GAS COAL, to be delivered free at the Railway Station at Skipton, or at the Council's Siding adjoining the Gas-Works on the Leeds and Liverpool Canal, and also delivered at the Pit Mouth between July 1, 1901, and July 1, 1902, in monthly quantities.

No Form of Tender issued.

Further Particulars as to Periods and Quantities of Deliveries, &c., may be obtained from the Manager, Mr. J. H. Woodward, Gas-Works, Skipton; and Tenders, endorsed "Tender for Gas Coal," are to be sent to him on or before Saturday, June 8, 1901.

The lowest or any Tender not necessarily accepted.

RICHARD WILSON,
Clerk to the Council.

May 23, 1901.

COUNTY BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Halifax Corporation invite TENDERS for the SUPPLY of:—

1. BRASS MAIN COCKS,
2. BRASS LAMP FITTINGS, &c.,
3. BRUSHES,
4. CAST-IRON PIPES,
5. WROUGHT-IRON TUBES AND FITTINGS,
6. OILS, PAINTS, &c.,
7. OXIDE OF IRON,
8. SULPHURIC ACID,
9. CLEANING WASTE,

And for the PURCHASE of:—

1. BRIMSTONE,
2. SPENT OXIDE OF IRON,
3. GAS CARBON,

for the Twelve Months ending the 30th of June, 1902.

Forms of Tender and further Information may be obtained on application to Mr. Thomas Holgate, M.Inst.C.E., Engineer, Gas-Works, Halifax.

Tenders, properly endorsed, to be sent to the undersigned before Two o'clock p.m. on Wednesday, the 12th of June, 1901.

The persons whose Tenders are accepted will be required to observe the Fair Contracts Clauses adopted by the Corporation.

By order,
KEIGHLEY WALTON,
Town Clerk.

TENDERS FOR GAS COKE.

THE following Gas Authorities—Burslem, Longton, Stoke, Newcastle, Fenton—are prepared to sell their SURPLUS COKE. The total quantities will be from 20,000 to 25,000 tons for the Year ending June 30, 1902.

Tenders for the whole or any portion thereof to be sent in, sealed and endorsed "Tenders for Gas Coke," to Alderman J. G. Bakewell, Longton Gas-Works, not later than Twelve o'clock noon, Friday, June 7.

Forms of Tender may be obtained from the Town Clerks of any of the above Authorities.

Neither the highest nor any Tender will necessarily be accepted.

CORPORATION OF LEICESTER.

GAS COAL.

THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the supply of COAL, COBBLES, or NUTS, about 180,000 tons, for the Twelve Months ending May 31, 1902.

Particulars and Form of Tender can be obtained on application to the Engineer.

Tenders, addressed to Alderman Lennard, J.P., Chairman, and endorsed "Tender for Gas Coal," to be delivered at these Offices not later than Eleven o'clock a.m. on Saturday, June 15, 1901.

The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Offices: Millstone Lane, Leicester,
May 31, 1901.

TENDERS FOR GAS COAL, TAR, &c.

THE Directors of the Oakengates and St. George's Gas and Water Company invite TENDERS for the supply of 1600 Tons of the best screened GAS COAL, delivered free at the G.W. Rly. Station, Oakengates, in such quantities as may be required, between July 1, 1901, and June 30, 1902.

No Form of Tender issued.

Tenders, endorsed, and accompanied by an Analysis of the Coal offered, to be sent to the Manager on or before June 19, 1901.

Tenders also required for the purchase of the surplus Tar and Ammoniacal Liquor produced at their Works for a period of One Year.

The Directors do not bind themselves to accept the lowest or any Tender.

EDWARD PARKER,
Manager.

Gas Office, Oakengates,
May 31, 1901.

PAIGNTON GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Paignton Gas Company are prepared to receive TENDERS for the supply of about 3000 Tons (or such other quantity as may be agreed on) of best approved GAS COALS, to be delivered in such monthly quantities as may be required by the Company.

Tenders to state the Price of the Coal, delivered at Paignton Station, Great Western Railway, free of all charges.

The Directors do not bind themselves to accept the lowest or any Tender.

Further Particulars may be obtained on application to Mr. C. G. Dawson, the Company's Manager.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of Coal, to be sent on or before the 8th of June, addressed to the undersigned, Gas Offices, 5, Victoria Street, Paignton.

F. W. PUDDICOMBE,
Secretary.

Paignton, May 23, 1901.

BOROUGH OF ROTHERHAM.

(GAS DEPARTMENT.)

THE Gas-Works Committee are prepared to receive TENDERS for the Construction of a BRICK TANK, 154 ft. in diameter by 35 ft. deep.

Plans, Specifications, and further Particulars may be obtained upon application to the Engineer, Gas Offices, Rotherham, upon depositing a fee of Two Guineas, which will be returned upon receipt of a *bonâ-fide* Tender.

The Contractor must not pay less than the Standard Rate of Wages paid in the district, and must observe the proper Conditions of Labour, and no Sub-Contracting will be allowed except by permission of the Corporation.

Tenders to be delivered to the undersigned on or before June 18, endorsed "Tender for Gas-Tank."

By order,
H. HAMPTON COPNALL,
Town Clerk.

Town Hall, Rotherham,
May 24, 1901.

CORPORATION OF ROTHERHAM.

(GAS DEPARTMENT.)

THE Gas Committee of the Rotherham Corporation are prepared to receive TENDERS for the Supply, Delivery, and Erection of a TWO-LIFT GUIDE-FRAMED GASHOLDER.

The Committee also require an alternative TENDER for a COLUMNLESS SPIRALLY-GUIDED HOLDER with Patent Improved Spiral Plates.

The Contractors must not pay less than the Standard Rate of Wages paid in the District, and must observe the proper Conditions of Labour; and no Sub-Contracting will be allowed except by permission of the Corporation.

Plans and Specifications may be obtained upon application to the Engineer, Gas Offices, Rotherham, on payment of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.

Tenders, endorsed "Gasholder," to be delivered to the undersigned on or before June 18, 1901.

The Corporation do not bind themselves to accept the lowest or any Tender.

H. HAMPTON COPNALL,
Town Clerk.

Town Hall, Rotherham,
May 24, 1901.

THE Directors of the Oxford Gas Company invite TENDERS for the supply of 33,000 Tons of best GAS COAL, to be delivered free into the Company's Siding on the Great Western Railway at Oxford, during the Twelve Months ending June 30, 1902.

Tenders to be sent in not later than June 12, 1901.

J. ELDRIDGE,
Manager.

BURSLEM CORPORATION GAS DEPARTMENT.

TENDERS FOR COAL.

THE Gas Committee of the above Corporation invite TENDERS for the supply of COAL for the ensuing Twelve Months.

Forms of Tender may be had by application to

HENRY PEATY,
Engineer and Manager.

Gas-Works, Longport.

READING GAS COMPANY.

TAR.

THE Directors of the Reading Gas Company invite TENDERS for the purchase of their surplus TAR for One Year, commencing on the 1st of July next.

Specifications for the Contract will be forwarded on application.

Railway communication direct to the Works.

Tenders, endorsed "Tender for Tar," must be delivered not later than Monday, the 17th of June, to

ARTHUR H. CANE,
Secretary.

7, King Street, Reading,
May 31, 1901.

LONG EATON GAS COMPANY, LIMITED.

TENDERS FOR COAL.

THE Directors of the above Company invite TENDERS for the supply of GAS COAL and CANNEL for One Year commencing July 1 next.

Form of Tender and Conditions may be obtained on application to the undersigned.

The Directors do not bind themselves to accept any Tender.

G. STEVENSON,
Secretary and Manager.

Gas-Works, Long Eaton,
May 30, 1901.

TENDERS FOR GAS COAL.

THE Corporation Gas Committee of Stoke-upon-Trent invite TENDERS for the supply of 13,000 Tons of GAS COAL.

Specification and Form of Tender may be obtained on application to the undersigned or at the Gas Offices.

Tenders to be sent in not later than Twelve o'clock noon on the 7th day of June, 1901, addressed F. Geen, Esq., J.P., Chairman of Gas Committee, Stoke-upon-Trent, and endorsed "Tender for Gas Coal."

WM. PRINCE,
Engineer and Manager.

Gas Offices, Stoke-upon-Trent,
May, 1901.

TENDERS FOR GAS COAL.

THE Spalding Urban District Council Hereby invite TENDERS for the supply of 2000 to 3000 Tons of best GAS COAL or NUTS to be delivered f.o.b. in the Tyne or at the Gas-Works, Spalding, and also for the supply of 2000 to 3000 Tons of best INLAND COAL or NUTS, to be delivered at the Gas-Works, Spalding, in such quantities and at such times as shall from time to time be required up to the 31st of July, 1902.

The Council do not bind themselves to accept the lowest or any Tender.

Tenders, endorsed "Tender for Coal," to be sent to the undersigned on or before the 13th of June next.

No Form of Tender supplied.

H. H. HARVEY,
Clerk to the Spalding Urban District Council.

May 25, 1901.

SOUTHWARK AND VAUXHALL WATER COMPANY.

TO COAL MERCHANTS.

THE Directors invite Tenders for the supply at their several Stations of about 30,000 Tons (more or less) of COAL during the Year ending June 30, 1902.

Specification and Form of Tender may be obtained at the Office of the Engineer, and the same must be sent in not later than the 17th of June next, addressed to the Chairman, Southwark and Vauxhall Water Company, Southwark Bridge Road, London, S.E., endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any Tender.

SOUTHWARK AND VAUXHALL WATER COMPANY.

May 30, 1901.

SOWERBY BRIDGE URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR COAL AND CANNEL.

THE Gas Committee are desirous of receiving TENDERS for 14,200 Tons, or less, of COAL, and 1200 Tons of CANNEL, required for the Gas-Works at Sowerby Bridge and Luddenden Foot for the Year ending May 31, 1902.

Specifications and Forms of Tender may be obtained on application to Mr. J. Marsland, Engineer and Manager, Gas-Works, Sowerby Bridge.

The Gas Committee do not bind themselves to accept the lowest or any Tender.

Tenders must be sent in not later than Wednesday, June 12, 1901, endorsed "Tender for Coal" or "Cannel," and addressed to

R. W. EVANS,
Clerk to the Council.

Commercial Bank Chambers,
Halifax, May 30, 1901.

STANSTED MOUNTFITCHET GAS COMPANY, LIMITED.

THE Directors invite Tenders for the supply of 500 Tons double-screened COAL (more or less), to be delivered to the above-named Company's Works, in lots of Two Truck-Loads as required, from the 1st of June, 1901, to the 31st of May, 1902.

Sealed Tenders to be sent to the Secretary, A. Cass, at the Company's Registered Office, Bishop's Stortford, on or before Friday, June 7.

Dated May 29, 1901

LEAMINGTON PRIORS GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Leamington Priors Gas Company are prepared to receive TENDERS for the supply of the GAS COAL required by them during Twelve Months from the 1st of July next.

Particulars and Forms of Quotation may be obtained from the undersigned.

Tenders must be sent in on or before Tuesday, the 18th of June, 1901.

THOMAS BERRIDGE,
Engineer and Secretary.

EAST LONDON WATER-WORKS COMPANY.

Issue of £150,000 THREE PER CENT. DEBENTURE STOCK created under the Metropolis Water Act, 1899, and the East London Water-Works Act, 1900.

NOTICE is Hereby Given, that the Directors are prepared to receive TENDERS for the above ISSUE, bearing Interest at 3 per cent. per annum, less Income-Tax, and redeemable at par after the expiration of 25 years from the date of Issue, subject to Six Months' Notice being given by the Company.

This Stock is a legal investment for Trustees, and ranks with the other Debenture Stock of the Company for the payment of Interest, and has priority over the Ordinary Stock which amounts to £1,720,560. It is subject to a Reserved Price being fixed as provided.

Tenders must be delivered at the Company's Offices, 15A, St. Helen's Place Bishopsgate Street, E.C., not later than One o'clock on Thursday, the 13th of June ensuing.

The Purchase Money must be paid to the Company's Bankers as follows:—

£25 per £100 Stock allotted on or before the 22nd day of June, 1901.

£25 per £100 Stock allotted on or before the 10th day of August, 1901.

And the Balance on or before the 12th day of September, 1901.

And a full Half-Year's Interest upon the whole amount allotted and paid for will be due and payable on the 1st of January, 1902.

Particulars and Conditions of Sale, together with Form of Tender, may be obtained at the Company's Offices, or will be forwarded on application.

By order of the Court of Directors,
I. A. CROOKENDEN,
Secretary.

15A, St. Helen's Place, Bishopsgate Street,
London, E.C., May 9, 1901.

EAST LONDON WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS in respect both to the FOUR-AND-A-HALF PER CENT. and THREE PER CENT. DEBENTURE STOCKS WILL BE CLOSED from the 11th of June to the 29th of June prox., both days inclusive, and RE-OPENED on the 1st of July ensuing, on which day Interest Warrants on these Stocks will be payable.

By order,
I. A. CROOKENDEN,
Secretary.

St. Helen's Place, Bishopsgate Street, E.C.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate to DEBENTURE STOCK and BONDS, WILL BE CLOSED at Four o'clock p.m. on Monday, the 10th prox., for the Half Year ending on the 30th prox., and will be RE-OPENED on the morning of Tuesday, the 11th prox.

The Interest for the Half Year will be payable on the 1st of July next to the Proprietors registered on the closing of the Books.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., May 29, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

ALDERSHOT GAS AND WATER COMPANY.

360 £10 FIVE PER CENT. "E" PREFERENCE SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 18, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

KENT WATER-WORKS COMPANY.

SALE BY TENDER OF £60,000 FOUR-AND-A-HALF PER CENT. PERPETUAL DEBENTURE STOCK.

THE Directors invite Tenders for the ISSUE on SALE to the highest bidders of £60,000 FOUR-AND-A-HALF PER CENT. PERPETUAL DEBENTURE STOCK, authorized to be raised under the Kent Water-Works Act, 1888.

The Ordinary Capital of the Company raised is £868,000, which comprises £708,000 Capital Stock, on which the Dividend for the last Half Year was at the rate of 10 per cent. per annum, with a further Dividend of 4 per cent. per annum on account of back Dividends; and £160,000 New Capital Stock, on which the full Dividend of £7 per cent. has been paid since its issue.

The Loan Capital raised is £122,000—viz., £42,000 by Mortgages, and £80,000 by Debenture Stock.

This Stock is an authorized investment for Trustees.

Forms of Tender with Particulars and Conditions may be obtained on application to the Secretary.

Tenders must be sent in on or before Friday, the 14th of June.

By order of the Directors,
A. DICKSON, Jun.,
Secretary of the Company.

Kent Water-Works Offices:
Mill Lane, Deptford, S.E.,
May 15, 1901.

KENT WATER-WORKS COMPANY.

SALE BY TENDER OF THREE PER CENT. DEBENTURE STOCK (INTERCOMMUNICATION).

THE Directors invite Tenders for such amount of THREE PER CENT. DEBENTURE STOCK, or of any portion thereof being a multiple of £10, as may in the whole be sufficient to realize the sum of £11,512, being the Sum expended by the Company in the construction of Intercommunication Works under the provisions of the Metropolis Water Act, 1899.

This Stock may be redeemed at par at the option of the Company at any time after the expiration of 25 Years from the date of issue upon six months' previous notice to the registered holders thereof. It ranks *pari passu* with the other Debenture Stocks of the Company for the payment of Interest.

This Stock is an authorized investment for Trustees.

Forms of Tender with Particulars and Conditions may be obtained on application to the Secretary.

Tenders to be sent in on or before Friday, the 14th of June.

By order of the Directors,
A. DICKSON, Jun.,
Secretary of the Company.

Kent Water-Works Offices:
Mill Lane, Deptford, S.E.,
May 15, 1901.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate to DEBENTURE STOCK, WILL BE CLOSED at Ten o'clock forenoon, on Friday, the 7th of June next, for the Half Year ending the 30th of June, 1901, and will be RE-OPENED on Friday, the 14th of June next.

The Interest for the Half Year will be payable on the 1st day of July next, to the Proprietors registered on the closing of the Books.

By order of the Board,
JAMES RANDALL,
Secretary.

Offices of the Company:
Willoughby Lane, Tottenham,
May 31, 1901.

LITTLEHAMPTON GAS COMPANY, LIMITED.

ISSUE OF 800 NEW £5 SHARES.

SPARKS & SON are favoured with in- structions to SELL BY AUCTION, at their Sale Room, No. 25, High Street, Littlehampton, on Wednesday, the 12th day of June, 1901, at 3.30 p.m. precisely,

800 £5 SHARES

in the above Company (paying 7 per cent.) in Lots of Four Shares each.

Full Particulars and Conditions of Sale may be obtained of Mr. W. BELDAM, the Company's Secretary, at LITTLEHAMPTON; or at the Offices of the AUCTIONEERS, at LITTLEHAMPTON or ARUNDEL.

BY EDWIN FOX AND BOUSFIELD.

AT THE AUCTION MART.

On Wednesday, June 12, at 2 for 3 o'clock, in Lots.

By Order of the Court of Directors, and pursuant to the Auction Clauses of the Company's Act of 1878.

GRAND JUNCTION Water-Works Com- pany £30,000 NEW CAPITAL—in 600 £50 New Seven per Cent. Shares, in such lots as, while enabling the large Capitalist readily to acquire a considerable holding, will admit the smaller Investor to participate in the advantages of an interest in this well-known London Water Company.

The above Shares form part of, and have the same Powers and Privileges as, the existing Ordinary Capital of the Company, and are entitled to a Dividend not exceeding £7 per cent. per annum. The gross rental in 1875 was £121,559, and in 1900 it amounted to £228,190—an increase to nearly cent. per cent. in 25 years.

In Lots of Two Shares each; the buyer of one lot will have the right of taking further lots at a like price per Share without competition.

Particulars of the Secretary of the Company, at the Chief Offices, No. 65, South Molton Street, Oxford Street, W.; at Messrs. Edwin Fox and Bousfield's Office, 99, Gresham Street, Bank, E.C.; and of the Company's Solicitors, Messrs.

BIRCHAM AND Co.,
46, Parliament Street, S.W.

NITRATE of Thorium and Cerium.
FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND Co., HAMBURG.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars Price, &c., apply to Mr. EDWARD PRICE, "Langley," Wyke Avenue, WORTHING.

Prices are Reduced.

ARMSTRONG'S
PATENT
CANDLE SAFETY LAMPS
Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.

48, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

HYDRAULIC BLOWER
For blowing Air into Gas Purifiers for the purpose of
REVIVIFYING THE FOULED OXIDE.
Full Particulars on application.
LUXWERKE LUDWIGSHAFEN AM RHEIN.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

JAMES OAKES & CO.
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 Inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

BOLDON GAS COALS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

As per Analysis by
Mr. JOHN PATTINSON, F.I.C., F.C.S.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.
Telegraphic Address: "PARKINSON, NEWCASTLE."

HARDMAN & HOLDEN, LD.
ESTABLISHED 1820.
SULPHURIC ACID.
GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.
Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.
Head Office: Miles Platting, MANCHESTER.
Inquiries Solicited.

FOR SALE, EXCEPTIONAL BARGAIN IN SECOND-HAND
ANNULAR CONDENSERS
as per Illustration below.

In perfect Order and Condition.
Complete with 16-inch Valves and Connections.
Diagonal Tubes dispensed with if desired.
Cheap, less than Half New Price accepted.
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Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

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Illuminating Power $16\frac{1}{10}$ Stand. Sperm Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
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Fitted with Steel

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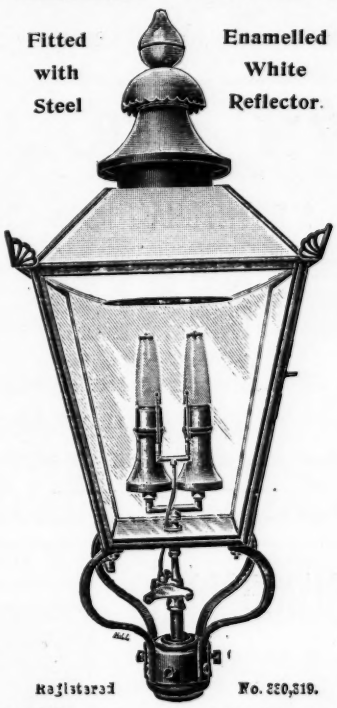

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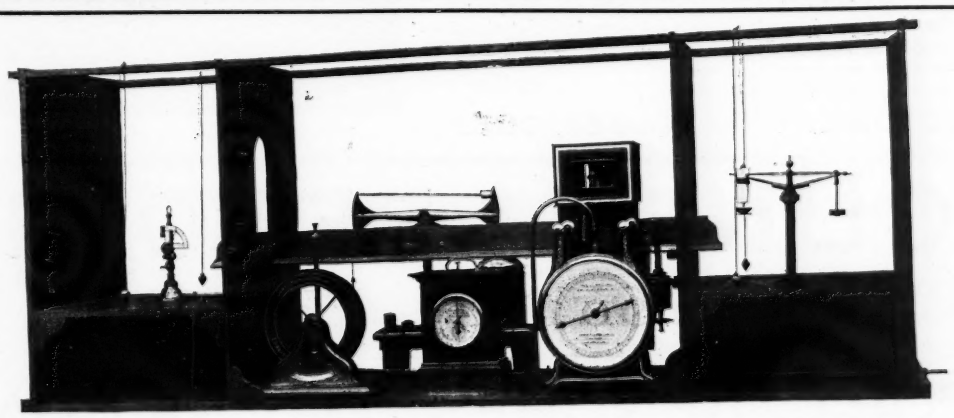

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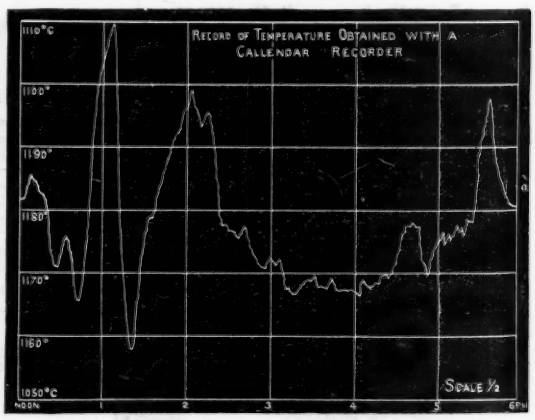

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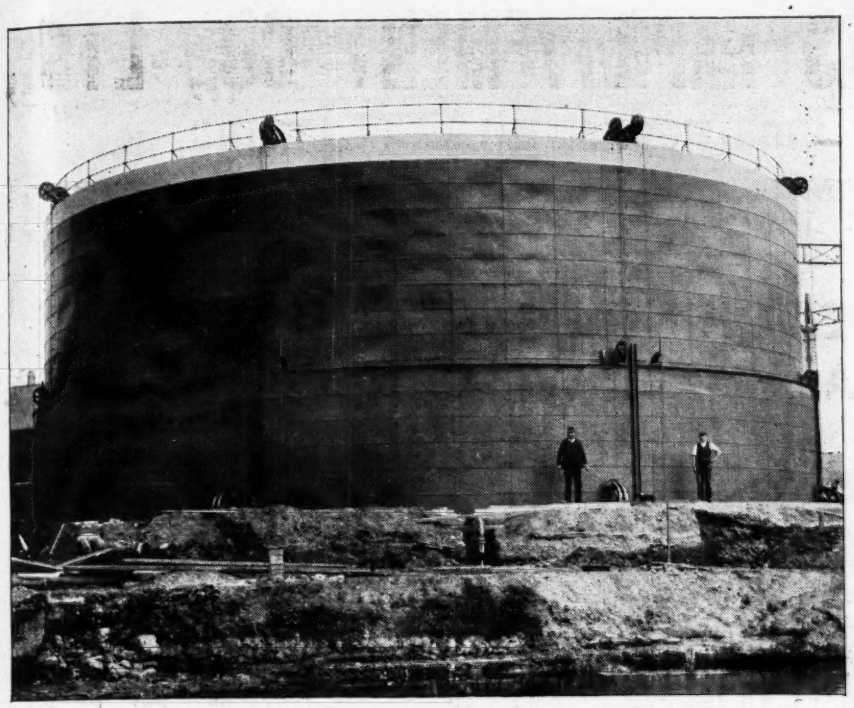

Two-Lift Cable-Guided Gasholder, 80 ft. diameter by 20 ft. deep.
STAFFORD CORPORATION GAS-WORKS. (*From a Photo.*)

COPY OF TESTIMONIAL.

CORPORATION OF STAFFORD,
GAS & ELECTRICITY DEPARTMENT,
STAFFORD, *Feb.* 9, 1899.

Messrs.
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I am, sincerely yours,
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Engineer.

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An action was instituted by that Firm against **THE BRIGHOUSE CORPORATION** in the High Court of Justice asking for an injunction restraining them from Infringing their alleged Patent Rights.

After entailing considerable expense upon themselves and upon the Corporation, the **NEW CONVEYOR COMPANY** had to abandon the Action, and have **NOW TO PAY ALL COSTS AND EXPENSES** connected with the same.

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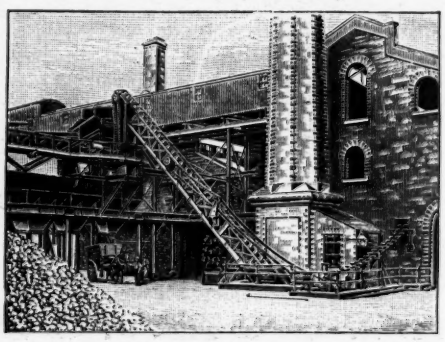
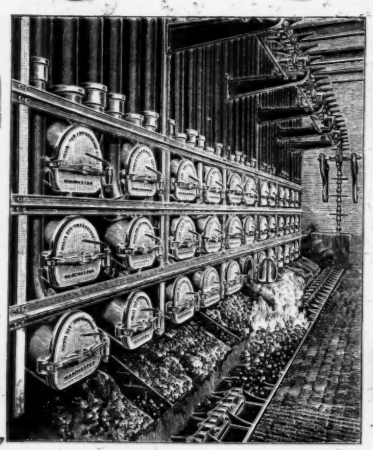
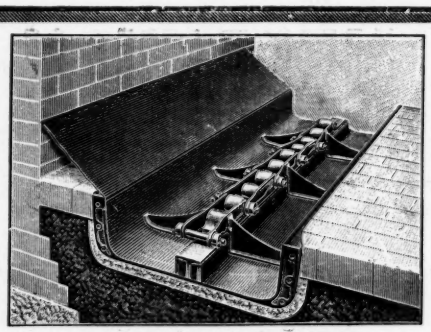


VIEW SHEWING END OF COKE CONVEYOR, ELEVATOR AND CONVEYOR FOR STORING COKE IN HOPPERS AND COKE YARD.



INTERIOR OF RETORT HOUSE SHEWING COKE CONVEYOR.



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Silent in Action. Simple Wearing Parts. Does not make Breeze.

SPECIALLY ADAPTED FOR CONVEYING, ELEVATING, AND STACKING HOT COKE FROM GAS-RETORTS OR COKE-OVENS.

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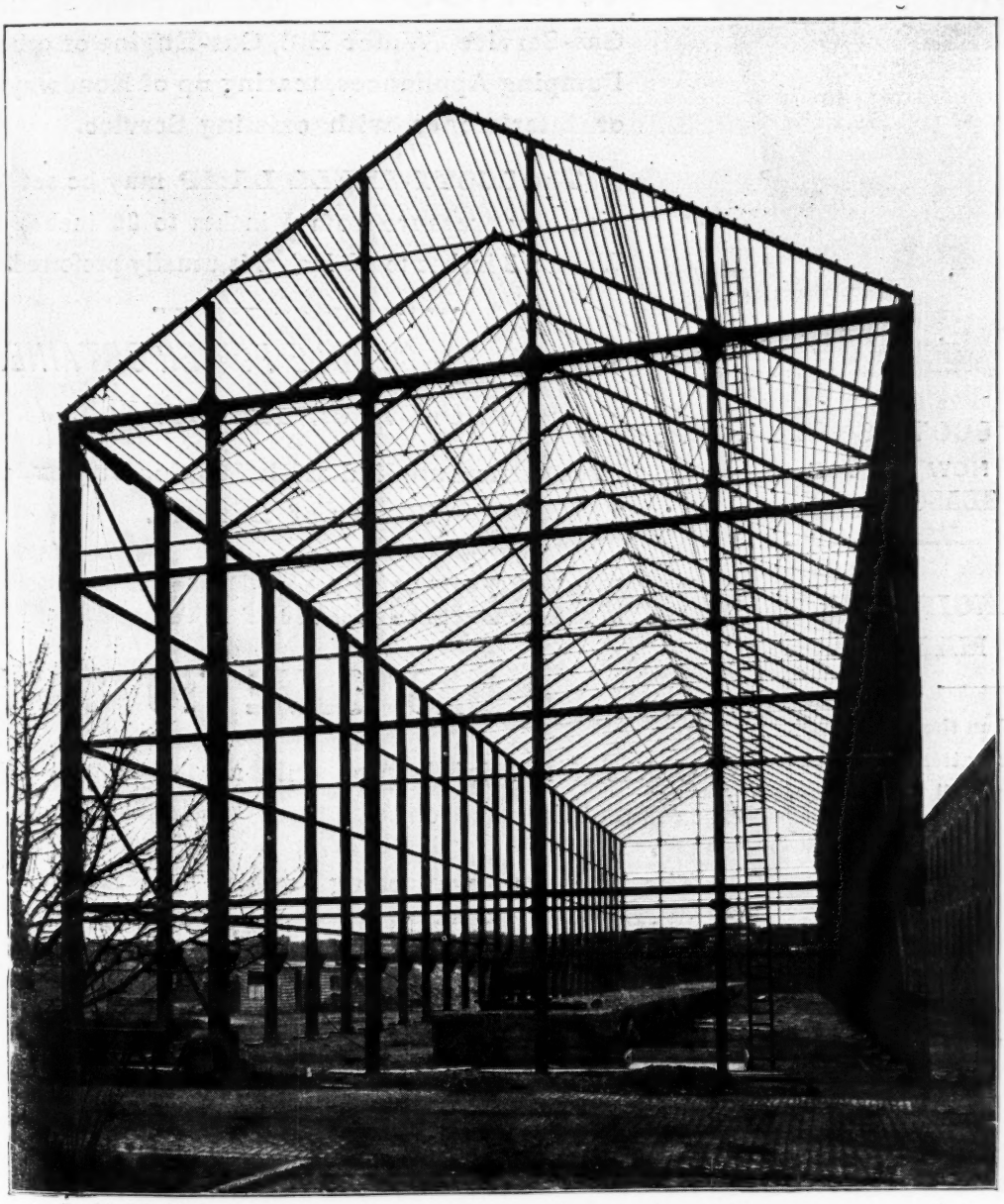

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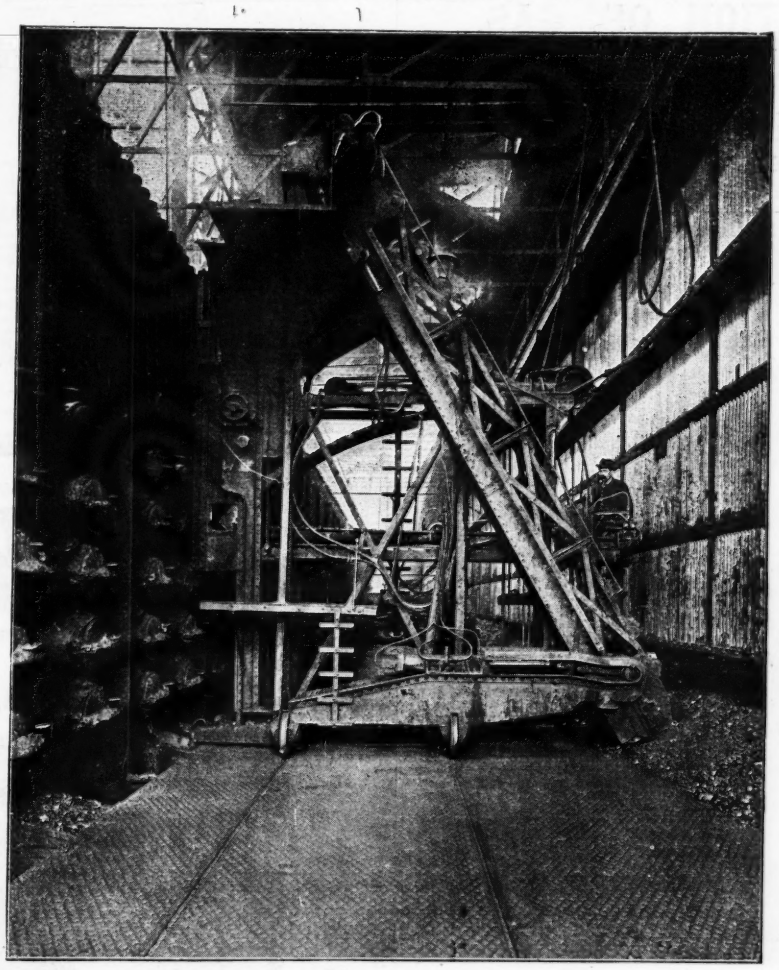

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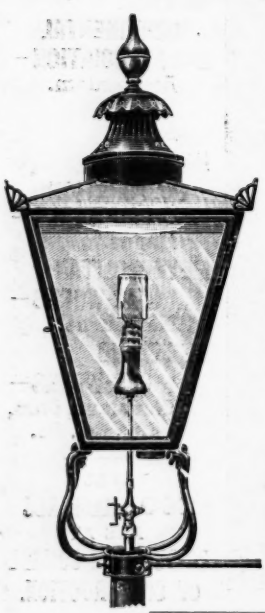

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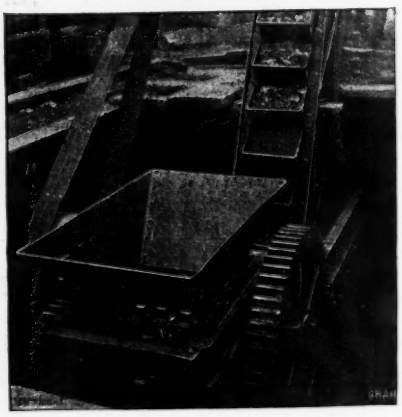

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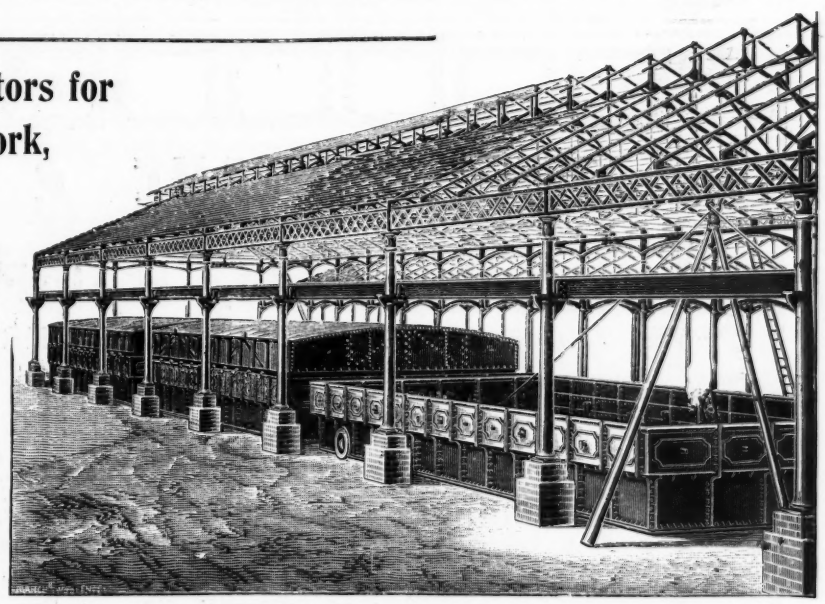

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ESTIMATES ON APPLICATION.

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